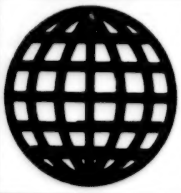
JPRS-EST-94-013
13 June 1994



FOREIGN
BROADCAST
INFORMATION
SERVICE

JPRS Report

Science & Technology

Europe/International
Economic Competitiveness

Science & Technology

Europe/International

Economic Competitiveness

JPRS-EST-94-013 *13 June 1994*

CONTENTS

WEST EUROPE

SCIENCE & TECHNOLOGY POLICY

CORPORATE ALLIANCES

CORPORATE STRATEGIES

EAST-WEST RELATIONS

EUROPE-ASIA RELATIONS

SCIENCE & TECHNOLOGY POLICY

Italy: EC Research Commissioner Ruberti Interviewed

BR1404094294 Turin MEDIA DUEMILA
In Italian Feb 94 pp 42-48

[Interview with Antonio Ruberti, EC Commissioner for Scientific Research, Training and Education, by Giampiero Gramaglia in Rome; date not given: "European Union on the Threshold of the 21st Century"—first two paragraphs are MEDIA DUEMILA introduction]

[Text] Rome—"We have worked hard, in the spirit of the Maastricht Treaty for European Unity, and without waiting for it to come into force at the beginning of November. This work has launched the Community into the year 2000, because the programs that are being started now will lead us up to the threshold of the 21st century and will therefore not only foreshadow the policy of the Community, but also that of the union that will constitute it. The factors of economic and institutional crisis, which have conditioned other sectors, have, in a certain sense, highlighted the importance of research and training."

Antonio Ruberti, 67 years old, an engineer, rector of "La Sapienza" University in Rome, Italian research minister, and finally, European commissioner for scientific research, training, and education since January 1993, outlines the results of his first "European" year in this interview with MEDIA DUEMILA and indicates the ambitions and prospects for 1994: positive signs and even optimistic notes against the gray background of a Community that is moving at a reduced pace.

Gramaglia: Which events highlighted the year in which you made your European debut?

Ruberti: The Maastricht Treaty came into force in 1993 and this made it a special year because, amongst other things, it has also modified the role of the Community in the sectors that I am directly responsible for: scientific research, where there is a procedure for joint decision making, and education and training, for which two specific articles have been introduced into the treaty.

On the one hand therefore, we were dealing, and are still dealing, with the enforcement of institutional change. On the other hand, on the research front, we find ourselves on the eve of the expiration of the framework program while the end of all training programs for young people is imminent, December 1994. Therefore it is necessary to start work on new programs.

It has been a busy year in my sectors at a legislative level, because the introduction of the new treaty coincided with the expiry of all the programs. We have produced new proposals, and we have started to examine them in accordance with the procedures for joint decisions that have just been introduced. For example, as far as research is concerned, there is provision for joint decision making by the Council of Ministers of the 12 member countries and by the European Parliament. The council strongly believes that we need to be unanimous and this is a very binding condition.

Gramaglia: This procedural preamble having been completed, what are the results of a year's work at the European Commission?

Ruberti: Let us start with research and the framework program. We formulated the commission's proposal in May, we started the decisional process, and we are prepared to manage the procedure for the joint decision. We are the first to do it and we have had to try to make the points of view of both the parliament and the commission converge. Even though the Maastricht Treaty was not in force, we have worked as if it were for many months through a series of three-sided meetings of the council, parliament, and commission. Parliament was therefore able to give its own opinion as soon as the treaty came into force in November and the council was called to give its opinion at the beginning of December.

On 6 December, the ministers reached a common position on the division of the financial resources between the various activities and the various specific programs, expressed in the form of percentages, but not on the sum to be allocated. Nine member states backed the commission's proposal of ECU13.1 billion, while two wanted the sum to be reduced to ECU11.5 billion, and another was more willing to move closer to the initial proposal. It was decided to refer the question to the summit of the leaders of the 12 member countries, since it was thought that opinions at the highest political level should be given on this subject. Effectively, the heads of state and government took an important step in the desired direction, deciding that in any case not less than ECU12 billion will be assured for the fourth framework program, and that this sum could be supplemented with a reserve of ECU1 billion to be released at a later date.

As far as education and training were concerned, we had a choice. We either had to wait for the treaty, or to start work straight away. We took the second road, thereby also demonstrating the commission's commitment to the implementation of Maastricht. We prepared the guidelines for the education and training programs in May, and in September we approved a green paper on the introduction of the European dimension into schools, where up to now the Community has not ventured. The council has already been able to discuss it positively, so in December the commission will be able to put forward its own proposals. The new programs, which should replace all the programs that are coming to an end, have been drafted for the coming five years up to the year 2000, and so has the program for young people.

In short, the commission's proposals covering the entire research, education, and training front, had been prepared by the end of the year, as well as those for young people. As far as research is concerned the decisional process is already well ahead. The work done can therefore be summed up positively by expressing satisfaction with the ability of the commission to put its proposals forward and go ahead with the decisional procedures.

Gramaglia: The institutional deadlock, due to the late ratification of the Treaty of Maastricht and the economic

crisis, are factors that conditioned all the activities of the EC in 1993. Did they also affect your work, and to which extent?

Ruberti: I would say that things have gone well. Maliciously, one could think that the sector does not have such an immediate impact as others, and that being less constrained to measure itself against punctual expiry dates, it ends up being able to make progress on the sly and to respect schedules. But, honestly, I do not think that any more could be done.

On the contrary, without malice, but objectively, I believe that the entire sector has enjoyed a favorable climate because it is a key-stone for the reinforcement of competitiveness, and has been able to count on a climate of growing awareness.

Unemployment and the slowing down of the growth rate are problems that underline the importance of reinforcing the productive base with the contribution of research that can influence the capacity for innovation and contribute to the growth of competitiveness. Hereafter, from the governments' side, there has been support and almost a positive inflection toward the research effort.

This year the subject of training has also been constantly interwoven with the debate on unemployment because professional training plays a strategic role in the management of changes in the labor market. Yes, I would talk precisely of change. The character of the market is becoming increasingly dynamic. There is an evolution in the professional figures required. There is the problem of continuous qualification. All this has created a general awareness of the need for a greater obligation to training systems.

And that is not all. More attention is also being given to education on a European scale. The loss of social cohesion, the painful phenomena of racism that have manifested themselves here and there, and the malaise of the large urban centers, have exalted the role that the school can also have from the point of view of the growth of awareness in a European dimension and of the attainment of a consciousness of being citizens of one's own country and also citizens of a united Europe.

Gramaglia: Therefore the Community programs need to include innovations so that we can face this change. How do the proposals that you have presented answer this need?

Ruberti: The programs that I have proposed have a characteristic of continuity with respect to the past, but they also contain innovative elements. In my judgment there is a balance between continuity and innovation. As far as research policy is concerned, on one hand there is a patrimony that has grown over the last 10 years, and on the other hand there is the necessity to adapt to the changing requirements that have asserted themselves in the meantime.

Gramaglia: Let us look at the strong points in that "patrimony" that has developed from the foundation of the first programs at the beginning of the 'eighties up to the last program plan that was managed by another commissioner, Filippo Maria Pandolfi.

Ruberti: It is an important patrimony. Naturally the framework programs have had excellent points and weak points, praises and criticisms. However, all things considered, the balance is positive on the whole. The Community's research initiatives have, over 10 years, contributed to building a fabric of European and international collaboration between industry, the universities, and research centers and to greatly increasing the willingness to work together.

There are sectors of research, such as fusion, in which cooperation has been strongly integrative. There are innovative sectors, such as telecommunications, biotechnology, and agriculture, in which there has been a contribution to the adaptation of the European productive machine.

However, despite the progress that has been made in the right direction, the EEC still has a problem of competitiveness. Research policies are fragmented with respect to those of the United States and Japan and this is an element of weakness.

After 10 years it is necessary to reflect and adjust the policy lines. There have been changes in the fundamental choices. At the beginning of 1993, when I took on the European mandate, I told MEDIA DUEMILA that I wanted to adopt lines that mirrored the three European weaknesses, and I have been faithful to the task.

The first weakness is the amount of the financial resources destined to Community research. Although remaining within the limits of the Community budget, the proposal formulated by the commission, of ECU13.1 billion, is near to the limits of possibility, and if it comes into effect it will allow the Community effort to increase, even if only a little, in contrast with the cuts that are often made in the individual countries (and parliament was on our side in this respect).

The second weakness is the fragmentation of the efforts. This is the reason why a line directed against fragmentation has been included in the framework program and provision has also been made for concrete forms of cooperation with the EUREKA [European Research Coordination Agency] program. This has been talked about since EUREKA came into existence. Now there are finally provisions for coordinating actions and a financial obligation from the commission. Furthermore, outside and beyond the framework program, we are working to establish an agreement with the European Space Agency (ESA) and with CERN (European Nuclear Research Center), still with the intention of making the activities that are developing in Europe converge.

The third weakness is perhaps the one that has the greatest effect on the productive system. It is the reduced ability to translate the results of research into industrial products and commercial successes. The situation changes from country to country, but, in substance, we do not have in Europe that connection, those instruments, and those mechanisms, that characterize for example the innovative capacity of the production system in the United States, and that are the result of collaboration between research centers and companies (it is sufficient to consider that researchers in the United States set up small innovative

industries). On this front, the framework program provides for a much more precise and clear obligation, and furthermore provides for assistance to be given to the mechanisms to transfer the results, not only of Community research, but also of all the processes that are developed. Within the 12 member countries, there are countries that have very advanced instruments in this direction, and others that do not have any. The action of the EEC will be equalizing.

Therefore, corresponding to the three weaknesses, there are the same number of innovations in the Community's research policy lines, with a strong political trend to inspire the specific programs and also the various operational activities.

Gramaglia: I agree, these are innovations, but they are essentially modifications of something that already existed. Is there anything that really did not exist before?

Ruberti: There is the introduction, for the first time, of a socioeconomic research line. This is an innovation on three fronts. Firstly, the one that I consider to be strategic is the setting up of ETAN (European Technology Assessment Network). ETAN takes account of the existence, inside the twelve countries, of various bodies for technological forecasting, and of the necessity to strengthen them and encourage them to cooperate to offer a basis of knowledge, data, and forecasts to the commission and to the governments, for choices on the research front. I believe that the launching of ETAN is an important quality step. It means creating the European support instrument that is necessary to make a research "policy."

The second innovation is the launching of research in the education and training field, with an item of expenditure to support it. I am an old and active supporter of the fact that innovation is based on research, also within the education and training system. My position is very clear. It is not possible to improvise the changes in the informational and educational systems, just as it is not possible to improvise those of technological innovation.

The third innovative element is sociological research, to take account of the social impact that the innovations, not only the technological ones, but also the institutional ones, have. For example, we are thinking of the effects that have come about as a result of European integration in an economic situation of increasing exclusion. Integration-exclusion, integration-diversity, they are binomials that Europe is measuring itself against. The goal is a reflection that will help existing European research centers, the universities, and the analyses that are underway, giving them a European level.

Gramaglia: Community research policy has often been criticized for not being integrated with the other European policies. Has anything been done about this?

Ruberti: There are examples of research being linked with Community policies. I will quote two cases. We have introduced a research line on transport into the framework program and we have "revisited" the computer science and telematics programs in the light of the development of transnational networks for computer science and telematics. We are looking at spin-offs for the manufacturing sector, employment, services, the market, health, teaching, and culture. We have already managed to link agricultural research to the new agricultural priorities in Europe. It is a case of coupling research activities with Community policies that are needed to structure the market.

Gramaglia: The Community, and in particular the commissions, have special instruments to do this, such as the Joint Research Center which has a laboratory at Ispra, Varese. Are these instruments used well?

Ruberti: The Joint Research Center, with its eight institutes, including Ispra, suffers from the phenomenon of image persistence. When there has been a crisis, it is difficult to forget about it, and to forget about its effects. Nevertheless, the center, and in particular Ispra, took noteworthy steps forward, after 1988, and nobody contests their quality any more today. There are problems that have been discussed in recent months regarding the way in which elements of competitiveness can be introduced into funding. When debating these, it is necessary to start with the fact that the center has institutional duties linked with the necessity of the Community to have, as every federal union has, a neutral and independent structure that gives technical and scientific support to its political choices. For example, this is the case for environmental policy, agricultural policy, and for the problem of market standards.

Furthermore it is necessary to take into account the fact that within the whole Joint Research Center, there are human potential, scientific structures, and infrastructures that enable important research work to be done. The problem is to see how to ensure, and how to divide, the funding, so that the basic nucleus of institutional duties can function, and so that there can also be a competitive force with other research centers for access to the resources.

The debate is between those who, like the United Kingdom, are more tied to the concept of private research bodies and those who are more tied to the public concept, especially when the independence and neutrality of certain activities are to be ensured. It is also necessary to take into consideration the fact that Ispra is engaged in nuclear fusion programs and programs to evaluate the safety of reactors. A solution must be found that offers the desired guarantees for institutional work, and at the same time stimulates the researchers to compete for part of the budget.

Gramaglia: It seems to me that your ambition is to hand over a research and training policy that has already been formulated up to the year 2000 to your successor at the end of your term of office.

Ruberti: I am very stimulated by the idea of working to see that these sectors of Community policy are backed by programs that will accompany them up to the year 2000. In the second year of my term of office, I hope to manage to complete all the approval processes for the package of specific programs in the fields of research and of instruction, training, and young people.

It is difficult to keep to the schedule, because the decision-making procedure is complicated and there is also the obstacle of the dissolution of the European parliament when its term of office expires next spring. I have introduced something that is completely new for research in order to reduce the times. Before launching the framework program I had already presented the scientific content of the specific programs that the commission approved last October. This means that, the overall program having been approved, parliament can immediately start to examine it.

It is a race against time for training too, where I would like parliament to at least be able to get through the first reading by May, before the dissolution.

Gramaglia: What are the structures and contents of the training and education initiatives?

Ruberti: In this field we have an extremely solid inheritance. Despite the fact that the treaties make no explicit provision for it, programs that are considered to be great successes have been developed: ERASMUS [European Community Action Scheme for the Mobility of University Students] for the mobility of students; COMETT [Community Program for Education and Teaching in the Field of Technology] for collaboration between research institutes and industry in professional training; LINGUA for language learning, and various others.

Since the mid-eighties the programs have been developed with different schedules. There was the problem of rationalization and there was also the problem of redefining the goals. Then we decided to restructure that which already existed into two large programs, one of these covered education and the other covered training, and they were linked respectively to Articles 126 and 127.

Then a general goal had to be defined: to contribute to creating an open space for education and training. We are not talking about the market, because in our opinion the word market is too closely tied to goods, we are talking about an open space, to be built on the basis of the recognition of professional qualifications and freedom for professionals to circulate. This open space will also be created by assisting cooperation between member states and bringing training systems closer together (not by standardization, because variety is also richness). The problem is to take into account the fact that every young person must be able to use his own competence throughout the European market.

What characteristics must this open space have? In my opinion it must have two; adequate quality, and innovative ability. The product quality assures that citizens have good doctors, good engineers and good lawyers, and it also assures the quality of the training being offered, so that young people can receive adequate training wherever they are. It must also have innovative ability, because in such a dynamic era, that is so subject to change, the system that prepares for an evolving society, and a productive system that is transforming, must be in tune with the new requirements.

And what are the instruments for obtaining the characteristics that we have identified? The instruments have been tested and now they must be consolidated and improvements must be made where necessary. First of all reciprocal information, so that each training system can be fertilized by the others and can in turn fertilize them with its direct experience. In this sense the varieties of European experiences enable knowledge transfer and improvements to be made. Second, the mobility of students, of professors, and of those working in schools is already a tradition in which 250,000 have taken part.

However, that which I call virtual mobility must be added to physical mobility, so that everybody can really be moved. Let us think about schools. Up to now the experience of mobility has been concentrated in the universities. They had 6 million students and 250,000 were made to move. However, if we consider all the categories and levels of students in the European Community, they total 60 million. It is necessary to resort to virtual mobility for them by training the teachers in a European way, or by the use of remote teaching, using telematics in schools, so that the children can talk with each other, know each other, and interact.

Information, mobility, and finally, to increase the capacity for innovation, support for the content and methodologies of innovative projects and transnational cooperation projects. It is a case of meeting a major requirement that I consider to be fundamental; the anticipation of needs. In a market society it is clear and inevitable that there will always be a certain gap between supply and demand. However, it is necessary to reduce it and therefore it is necessary to create a mechanism that will forecast needs, an observatory that enables the Twelve to anticipate future requirements.

This is how far our package of proposals and policy lines has gotten. However, there is something else. Elements that take into account the fact that today's young people must become European citizens must be introduced into the teaching programs. They must learn the languages and the cultures of the other countries, Community law, etc., and the Community must make its contribution.

For professional training, specifically, the question that is emerging is the prominent importance that continual training is assuming. It has been talked about for some time, but now the need is accelerating and growing. It is becoming increasingly necessary to continue to prepare oneself throughout all of one's life in order to face the accelerating industrial change.

Gramaglia: But who pays for this? Which, and where, are the structures that can do it?

Ruberti: These problems also return in the "white paper" that we have prepared. The responsibility of the countries and Community action can help. We find ourselves facing a significant question. How can a right to training be transformed into a right to study throughout one's entire life? What part of a salary or unemployment benefit must be spent to guarantee this right? It is a major social-political problem.

In the meantime we must improve the quality of our professional training system. We know that it is very

diversified with some countries well equipped and others in difficulty. Collaboration is necessary between public authorities and the social structures and it also necessary to look at how education and training systems, that now seem to have become parallel, can be linked. The school deals with initial education at various levels and not with the contribution that it could make to professional training, finding jobs for young people and professional requalification.

Gramaglia: So far we have spoken about programs, projects, and ideas. Let us now look at what was done at a management level in 1993.

Ruberti: Let us start with research, that weighs on funds 10 times more than education and training. There are criticisms of the management: The program is very varied and the projects are divided into many parts, involving 12 countries and thousands of institutes and researchers. The observations concern the burden of bureaucracy, the transparency of decisions and the regularity of tenders.

In an attempt to clarify matters we have prepared a manual containing the rules for participating in research programs and for stipulating contracts, and we delivered the first copy to the 12 research ministers on 6 December. The goal of the manual is to encourage a climate of trust between the operators and the users, and we are counting on it being widely distributed.

Then we have introduced some modifications into our way of working. For example, a calendar that is entirely well-known and above all definite. Invitations to tender will be published four times a year on set dates, 15 February, 15 June, 15 September, and 15 December, and only on those dates. Then the experts on the committees, nominated by the Community, will be rotated so that they do not build up relationships that are too permanent. Then the forms for participation have been simplified to the utmost. These forms are not the same thing as a contract, that obviously requires more data (this is an important innovation for independent researchers, and for small and medium-sized companies, because it reduces the work and costs involved in participation).

Furthermore, we are trying to establish an increasingly regular, and more complete, contact with the scientific and industrial communities through meetings, workshops, and stimulation initiatives, in order to avoid the isolation syndrome of a central structure that is cut off from those working in the field, during both the preparative and the management stages. Finally, we are cultivating cooperation with the large national research agencies.

Gramaglia: How does Italy respond to the stimuli that you send from Brussels?

Ruberti: In recent years there has been a growing awareness in Italy of European participation and ever since I was minister initiatives have been started to diffuse information. As commissioner I have had, and I have, contacts with the minister, with the rectors, and with the president of the CNR [National Research Council] that has recently inaugurated an office in Brussels. All this fervor of initiatives facilitates the circulation of information. We set them up and the national organizations set them up.

With the information, Italian participation in Community programs has increased in recent years, though we still have 11 percent of the funding against the potential 15 percent. However, this is also due to the size of the scientific system. I believe that a mainspring that will greatly encourage Community participation will soon click; the mainspring of the constraint on national funds. Certainly this is happening in all countries not just in Italy, and it stimulates greater attention and leads to European programs being considered with interest.

Everything considered, I am an optimist. The 10 years that have passed have been positive, and Italy's response will continue to grow. I believe that, in the long run participation is assured by researchers, scientific institutes, universities, and industrial research laboratories and that it is necessary to maintain the link with these. Naturally it is necessary to create a favorable environment. The cultural and political climate, and the effort people make, contribute to this.

Gramaglia: It seems to me that in your speeches you have often said that the role of the Community is not only that of making programs and managing them.

Ruberti: Certainly. I am convinced that the Community must also nurture the cultural and scientific debate on policies and particularly on the policies regarding research, science, technology, education and training. We have already taken some initiatives. For example, for 1994 we are already organizing meetings and studies of the major research themes, the relationships between science and society, and the researcher's statute in Europe, and, in the field of education, of quality and the criteria to evaluate it, of teaching and the institutes, and of the results of mobility in its various forms.

Then there are initiatives to assist the diffusion of scientific culture, like the European scientific culture week from 22 to 29 November 1993. The goal of this initiative was to meet the need to bring people closer to science and to favor reflection on its problems.

Alongside the programming and the management, then, is the third line of action. This is an exercise of general reflection on the problems of science and technology. The European Community must, in my opinion, nurture this, together with the individual states.

Gramaglia: Up to the end of the eighties the community thought of the United States and Japan as its partners and opponents in the research sector. After the fall of the Wall, eastern Europe and the former Soviet Union have been gradually opening up, and you have given particular impetus in this direction. Why?

Ruberti: The problem of relationships with third countries is very important, especially with those of central and eastern Europe, and we have both research and training activities underway. The subject of cooperation outside the boundaries of the EEC goes deep, and ahead of us there is enlargement, with the entry of the four EFTA [European

Free Trade Association] countries, who already participate in the programs of the Twelve.

Today the problem is that of central and eastern Europe. In 1993 we saw the formation of the European Foundation for the Independent States of the former Soviet Union, and we saw the start of its activities. Then there are some specific programs in which the countries of central Europe are participating, and there are support activities that form part of the PHARE [Poland-Hungary Aid for Economic Restructuring] programs, in fact there are various channels of cooperation. The European research program EUREKA, having already admitted Hungary, has recently admitted Russia.

Gramaglia: What contribution can the East make to European research?

Ruberti: I am convinced that a great scientific potential exists in those countries. There are schools that, in certain sectors, have developed like a parallel island, because they are outside the western international circuit. There are sectors, for example that of physics, that have been neglected by us, because we are all conditioned by the scientific and cultural environment in which we live.

The recovery of this potential can offer Europe a chance to relaunch itself on the world scene. There is, therefore, a real interest and a strategic plan behind helping this great scientific potential, saving it, and collaborating with it. Even if afterwards, depending on the sectors, there could be competition in some cases instead of cooperation.

On the other hand there are also projects that we must "globalize" at a world level, as has been done for fusion. I have spoken with the American who is responsible, and I will speak to the responsible person from Japan in February. In my opinion the "globalization" of some "strategic" world research is engraved in the new international geopolitical order. There is also an economic reason for this, because certain efforts can only be supported by working together.

In front of us we have the need to restore competitiveness in Europe. We have a great tradition and a great potential, but we must overcome the problems of fragmentation if we are really to avoid the decline of Europe. Next to this goal, without contradiction, there is that of cooperation, because cooperation is easier when it is strong and it can affect the major choices in the most balanced way.

ESA To Test Satellite Data Transmission By Laser

BR2104134994 Amsterdam POLYTECHNISCH WEEKBLAD in Dutch 18 Feb 94 p 1

[Article by Rene Raaijmakers: "Advance of Communication Lasers in Space Industry. No Need for Radio Frequencies in Future Satellites"]

[Text] Noordwijk—In 1997, for the first time in history, two satellites will transmit using light. It will only be a test, but data transfer using infrared lasers instead of radio waves ultimately promises great advantages.

In an artist's impression or on a photograph of a hovering man-made moon, two significant components are instantly noticeable: the solar panels and the dish antenna. Such a view could drastically change if satellites start using optics for communication. The dish would disappear altogether and the solar panels would become smaller. Volume and weight savings are within reach, and those are powerful criteria in competitive space exploration. The European Space Agency (ESA) will therefore start experimenting with lasers and optical receivers within the next three years.

Optical Data Transfer

ESA is taking the first step with the launching of the French earth observation satellite, Spot-4, at the end of 1996. Shortly after that, at the beginning of 1997, Artemis will be launched into space. Artemis is an advanced geostationary satellite by which various new telecommunications systems will be tested. These two will be the first to make use of optical data transfer. In addition to the usual dish antennas, with a diameter of almost three meters, each satellite will be specially equipped with a telescope 25 centimeters in diameter.

An optical receiver with this diameter would at the moment be no lighter than the dish antennas. But when lasers with a higher capacity are used in the future, the mass of the optical modules could well decrease. "There are as yet no advantages with these first attempts. But by the second or third generation we make a profit," said Gotthard Oppenhauser, payload manager Data Relay Technology Mission (DRTM) at ESTEC in Noordwijk. Spot-4 will send remote sensing data back to the earth via Artemis. The Spot observation satellite orbits at a high speed only 700 to 800 kilometers above the earth's surface and can as a result remain in contact with an individual ground station for no longer than 10 minutes. The Silex optical modules on board Artemis and Spot-4 will, however, enable a direct connection between the observation satellite and the control room in Toulouse (France). Contact is possible as long as Spot-4 is within view of Artemis, which will hover 36,000 kilometers above the earth. Every 50 minutes, Spot will disappear behind the earth's sphere and will in practice be in direct contact with Artemis for only about half of its orbit.

Greatest Challenge

This also means that the satellites will continually have to search for each other. They will send out strong signals with 19 high capacity lasers, each of 500 milliwatt. This 'searchlight' cannot be relied upon for communication, but only for identification. For the actual transmission, a 100 milliwatt semiconductor laser will be installed. Both kinds are (aluminum gallium arsenide) semiconductor lasers with a wave length of about 800 nanometers. This wave length was chosen because it is suitable for the most sensitive receivers. There will be two reserve 100 milliwatt lasers on board.

The greatest challenge in the ESA project is the development of a very accurate tracking system. For communication purposes, a continuous connection is necessary between the stationary Artemis and the Spot-4, which will

be moving at a speed of 30,000 kilometers an hour. The Silex modules on board Artemis and Spot-4 must be able to track each other at an accuracy level of 0.50 millidegrees. This means that at a distance of 36,000 kilometers, a deviation of a maximum of 100 meters would be allowed. Sensors and electronics must constantly read, calculate, and correct the deviation. The laser signals from Artemis will also be received at an optical ground station on Tenerife. At an altitude of 2,500 meters, and thus almost free of diffused light, a telescope one meter across will be erected during the second half of 1995. The optical antenna has already been made by Carl Zeiss Jena, with support from the German space institute DARA, and was completed in November 1993. At the moment it is undergoing extensive testing.

A Promising Future

The Silex terminals of which the lasers will form a part were developed by ESA in collaboration with the French space laboratory CNES [National Center for Space Studies]. The transmission speed is 50 megabits per second. With these optical modules, communication is also possible in principle over a distance of 40,000 kilometers at a speed of 100 megabits per second, but the electronics on the Spot-4 are still a limiting factor. Radio waves for satellite communications (with a wave length of 15 and one centimeters) generally also reach a transmission speed of 100 megabits per second.

In principle, however, lasers can be modulated with a much higher data speed. For satellite applications, however, a higher capacity is also necessary. "We are doing it with a simple but robust method," said Oppenhauser. "We are merely switching the lasers on and off 50 million times a second."

In the future the question to consider will be: greater data speed with more capacity, or a smaller telescope. In any case, Oppenhauser expects a ten-fold improvement in the sensitivity of the optical detection by use of more sensitive modulation methods very soon.

Not much energy is required for the laser transmission. The present lasers work at 100 milliwatt, while satellites for radio transmission need to be able to produce 30 Watt very quickly. It will therefore be possible to have smaller solar panels in the future.

A consortium of some 20 companies under the leadership of Matra Marconi Space will handle the production of the Silex terminals. The first commercial optical modules will be installed on the DRS1 and DRS2 (data relay satellites) which will probably be launched in 1998 and 2003 respectively.

Germany: BMFT-Funded Laser R&D Program Outlined

BR1904135194 Bonn TECHNOLOGIE-NACHRICHTEN PROGRAMM-INFORMATIONEN in German 15 Feb 94 pp 7-22

[Announcement of Federal Ministry of Research and Technology (BMFT)-sponsored program of applied laser research and development entitled "Laser 2000"]

[Excerpt] [Passage omitted]

5. Rules and Tasks of Research Policy

The "Laser 2000" funding program is designed to make a major contribution to the Federal Government's forward-looking research schemes.

In this connection, its purpose is to initiate pioneering, and timely, research work on the organizational, quality-enhancing, and health-care potential of laser application. This in turn will contribute, for instance, to the optimum development of 21st-century technologies. The state faces a growing challenge in this respect: Where technical regulations and standards are concerned, and in legislation as well, it must work toward the maintenance of the least harmful and objectionable industrial, living, and environmental conditions possible. In the current situation of ever more rapid technological change, it will help in the advance development of effective, standard-raising solutions that can be exploited in several sectors. Technology impact assessment projects will thus play a major role in the Laser 2000 funding program.

As far as industrial innovations are concerned, individual laser manufacturers in the Federal Republic are doing well against the international competition in niche sectors. This is particularly so with kilowatt-class CO2 laser beam sources and excimer lasers. These topical successes can largely be traced back to basic research findings dating from the seventies and eighties.

Laser beam source and laser system engineering now face new challenges that spring from the breaking of new scientific and technical ground and structural changes. These open up new prospects with a technologically new generation bringing miniaturized high-power diode lasers, diode-pumped solid-state lasers, and more compact gas lasers. These in turn bring changes in laser applications marked by higher precision and the opening up of new areas of application, particularly as a result of using extremely compact laser beam sources and new wavelengths.

The effort that this requires is too great for any one of the predominantly small and medium-sized businesses engaged in laser research and laser engineering. This is also due to the fact that future successes in laser engineering will require even greater interdisciplinary interplay among a wide variety of sectors of technology, such as optics, electrical, cooling, and microengineering, and materials and technical engineering. In such cases, state funding is needed where businesses cannot achieve research and technology developments of particular industrial or social significance under their own steam. The Laser 2000 funding program will create the appropriate research policy framework conditions for the provision of such funding.

On balance, it may be seen that the state funding measures envisaged for the laser research and laser engineering field specify the following need for action:

—to promote targeted basic and applied research on topics to which, in addition to knowledge-oriented significance, a high degree of relevance to industrial applications is already attributed, with special reference also to 21st-century technologies;

—to support R&D in research facilities and businesses as a contribution to the overall national economy and as a means of speeding up laser technology developments;

—to target funding at technologies whose relevance extends beyond single sectors or businesses, or which are needed to meet preventive responsibilities incumbent on the state (environmental conservation and health care), and

—to support measures designed to promote innovation and dissemination (including regulations, standards, and acceptance testing).

From the research and technology policy point of view, the prime task of the Laser 2000 funding program is to improve the framework conditions for this key technology via targeted offers of funding and measures designed to achieve structural improvements.

In laser engineering, this means, as will be set out below:

—maintaining a productive research infrastructure;

—setting new research priorities in laser science, and

—improving industry's capacity for innovation, particularly among small and medium-sized businesses.

5.1. Research Infrastructure

Nonuniversity research facilities have productive, application-oriented teams that have already been making a substantial contribution to the stage reached in laser research and laser engineering.

The far-reaching change occurring in industrial sectors is marked by an obsession with shorter and shorter innovation cycles. In laser engineering, this can only be achieved if, as previously, advanced industrial R&D succeeds in obtaining targeted scientific, technological, and application-oriented results. This, in turn, may be achieved to a greater extent with the support of a research and technology policy that promotes a research infrastructure designed for productive interdisciplinary cooperation and providing a reliable foundation for basic and applied research and industrial conversion.

In this sense, the Laser 2000 funding program is intended to support basic research and promising research projects for key technologies, particularly if they hold out hopes of cross-sector advances—such as the majority achieved through laser engineering—and thus open up long-term prospects and chances. The funding program will take on a supporting role in this respect.

5.2. Setting New Research Topics

Work to date by laser research institutes and industrial research has focused mainly on laser beam sources of "conventional" design and on basic applications in materials processing, such as cutting and bonding. The results of this work are currently going through the industrial conversion stage. Greater emphasis is to be placed on the new development trends outlined above.

If the lead in laser research and laser engineering is to be maintained and lost ground, for instance in solid-state laser development and new laser applications, is to be made up, businesses must focus on the following developments:

—the upcoming generation of lasers (development of high-power diode lasers and diode-pumped solid-state lasers; semiconductor technology is taking over from expensive tube technology here);

—the miniaturization and compacter design of laser devices for applications including materials processing;

—higher performance, better beam quality, and enhanced operator-friendliness in laser systems;

—the industrial exploitation of laser working principles that have to date mainly been studied in basic research (e.g., nonlinear optics and short-exposure spectroscopy), and

—the greater use of laser engineering applications developed to date (e.g., milling, bonding, and surface treatment).

These developments call for a new strategic funding policy approach on the part of the BMFT so that the technology can be mastered better and laser engineering and laser application market opportunities can be opened up.

Technology funding must be to the fore in this connection—or, in other words, the funding schemes concerned will be topic-oriented to take account of the efficiency of the overall economic structures.

5.3. Improving Industry's Capacity for Innovation

In view of the tougher international competition emerging in this area, there is already a desire for innovation that can be satisfied efficiently on the domestic and international market with improved technological know-how. This means that it is crucial to improve industry's capacity for innovation.

Owing to the complexity of laser engineering, this requires close cooperation on research between industry and the basic research facilities specializing in various disciplines. The resources that this requires are greater than small and medium-sized businesses in particular can afford. As a result, they cannot generally acquire a share of the market unless cooperation between industrial research and science and technology transfer institutes is facilitated and accelerated.

In a survey commissioned by the BMFT, the Ifo [Economic Research] Institute has identified the following chief obstacles to the wider use of laser applications, particularly where small and medium-sized enterprises (SME's) are concerned:

—technical problems (stage of development, service life [Standzeiten], and complexity);

—knowledge barriers (suitability for process, potential applications, and inadequate quality assurance).

Here, too, it is primarily up to industry itself to promote wider use. Only in selected areas, in particular in the breaking down of knowledge barriers and the introduction of laser technology in SME's will the state intervene for a limited period, as, left to their own devices, SME's in particular cannot close the research gap between the state of the art and concrete corporate problem-solving in this complex and relatively expensive technology.

This applies both to research and development projects designed to create new basic and applied solutions and to projects paving the way for and implementing innovation.

In the light of the efficiency of the overall industrial innovation and technology dissemination structures, the measures embodied in the Laser 2000 funding program are also devised in such a way as to support the conversion of the research findings into industrial applications.

The BMFT's funding measures are thus organized overwhelmingly in the form of industrial joint projects between science and industry, in the application-oriented basic research area as well. In this way, the interplay between state-financed research teams and engineers from industry mobilizes synergies to the advantage of both groups. Moreover, it is this joint work between science and industry that throws up interesting new topics for basic and precompetitive research. It swells the ranks of qualified junior scientists who facilitate the transition to industry and, consequently, "technology transfer via people" as well.

6. Goals and Focal Points of the Funding Program

The continuation of the funding measures in force to date has its point of departure in the scientific and technical level reached and in the development trends that are emerging or have emerged. Accordingly, the Laser 2000 funding program is based on a strategic approach aimed at:

—promoting the development of future areas of technology in line with an R&D policy that takes a long-term view and supporting precompetitive research as a means of safeguarding the foundations and scientific capability for the laser technologies of the next century as well;

—boosting industrial innovation through intensive cooperation between science and laser manufacturers and users in industry, and;

—building on the level of know-how acquired to date to promote the widespread application of lasers.

The following goals and focal points have emerged from the foregoing and from numerous discussions with specialists from laser science and the laser industry.

6.1. Stategic Goals of the Laser 2000 Funding Program

—laying the scientific and technological foundations for the laser technologies of the 21st century;

—supporting innovative laser technologies with a view to consolidating and enhancing the international competitiveness of industrial laser manufacturers and users, and

—dismantling knowledge and know-how barriers to the use of lasers.

6.2. Main Future Emphases in Laser Research and Laser Engineering

6.2.1. Principles for New Laser Generations

Fundamental new ground in laser beam sources is currently being broken at an international level. The laser will move in the direction of new and as yet unexploited working principles, in particular all-solid-state concepts, higher power densities, and enhanced beam quality. The scientific foundations must be laid now for this next generation. Major key projects are:

—high-power diode lasers and diode-pumped solid-state lasers, and

—new physical working principles in high-power gas lasers.

Other new laser beam sources will involve developing ultrashort wavelengths (i.e., in the direction of hard UV [ultraviolet] and soft X-ray radiation). Exploratory definition phases for new lasers, such as iodine oxygen and CO lasers, are yet another aspect.

6.2.2. Precision Processing With Lasers

Future applications will increasingly exploit the laser's capacity for use in precision processing with high definition in space and time. Future developments in laser engineering will also make major contributions to nanotechnology, microsystems engineering, and microelectronics in this respect. Major key projects are:

—laser process quality assurance;

—laser-induced manufacturing processes, and

—UV laser photon technology.

6.2.3. Principles for Opening Up New Fields of Application

New fields of application for laser engineering will be opened up by exploiting new physical laser principles, such as nonlinear phenomena and photons, as instruments of precision measurement. The following new fields of application have emerged from talks with specialists:

—laser-optical measuring and testing processes;

—nonlinear optics, and

—laser biodynamics and laser micromanipulation (penetration into the molecular and atomic sphere).

The spatial, and to an even greater extent the extremely high time resolution of laser processes will be exploited right up to their physical limits in laser-based measuring and testing systems. The key project will be:

—laser-optical measuring and testing processes for production and environment engineering.

In the interaction between light and matter, nonlinear effects occur exclusively at intensities that only the laser can provide. Nonlinear optics (NLO) has to date been the subject of basic research with relatively few fields of industrial application. Numerous NLO effects, such as

parametric amplification, the development of new frequency conversion ranges, and beam manipulation, will be studied with a view to industrial use.

In laser biodynamics, it is potentially possible, for example, to activate the restriction enzyme in genome analysis at least partially by laser beam.

6.2.4. Laser Medicine

Like mycrosystems engineering, laser engineering has great innovation potential as far as future developments in minimally invasive therapy (low-impact surgery) are concerned. Moreover, lasers provide medical diagnostics with a field of application of benefit to patients that is still in its infancy, nondestructive blood testing being just one important example. Overall, medical laser technology can also contribute to lowering health care costs.

The emphasis in future laser medicine research will thus be on acquiring a greater understanding of the interaction of laser-induced processes in biological systems, key projects being:

—new laser concepts for medical technology (interstitial laser applications and photoabrasive processes), and

—optical tomography.

Advances in laser medicine require an interdisciplinary combination of technical and medical research forces. The purpose of pursuing further technological development in medical engineering is to reduce patient stress (low-impact surgery), to enhance safety, and to shorten hospitalization and convalescence times. The measures will be coordinated, and where necessary implemented jointly, with the Health 2000 program and, as far as minimally invasive therapy is concerned, with the 1994-1999 Microsystems Engineering program.

7. Key Projects and Key Topics

The four research fields outlined above are subdivided into key projects designed to lay the industrial foundations for areas of technology of medium- to long-term importance and subtopics designed to create important scientific bases for new generations of technology and physical working principles. The projects will be organized in such a way as to bring together interdisciplinary approaches and to exploit synergies. In the phase currently reached in the implementation of the funding program, the concrete shape of the key projects and key topics is being modified to take account of the actual stage of development reached in science and technology. Priorities are being reset to make room for more recent developments. This is particularly the case in the "principles for opening up new fields of application" area.

The topic areas set out below are the result of intensive dialogue with representatives of science and industry. They are based on an assessment of numerous memoranda and surveys. They concern areas holding out prospects of high innovation potential and with a particular research and development requirement. Priority rests with high-power lasers and their applications. The current goals, tasks, and priorities will be further defined in the course of imminent specialist talks and contacts.

7.1. Foundations for New Laser Generations

Key Project: High-Power Diode Lasers and Diode-Pumped Solid-State Lasers

The transition from tube technology (gas lasers) to semiconductor technology (diode lasers) is creating a new technological generation, which in turn is bringing an advance in laser beam generation quality. New "all-solid-state" systems will make it possible to substitute high-power diode lasers and diode-pumped solid-state lasers at least in part for gas, dye, and conventional solid-state lasers in the range up to about 5 kW over the coming decades. This will require intensive, targeted basic research in the quest for new physical and methodical approaches.

The principle of using semiconductor devices, diode or semiconductor lasers, to generate coherent light has been known to science since 1962. Many applications in spectroscopy (pollutant analysis), metrology (interferometry), and communications (optical waveguide transmission, compact disks) are based on this "minilaser" measuring just a few 10ths of a millimeter, which is excited directly by electrical current and is capable of up to 50-percent efficiency. Optical information technology provides more widespread applications for semiconductor lasers, as they present a high modulation capability and a narrow spectral band at relatively low laser outputs (photonics).

The new demands placed on high-power diode lasers, on the other hand, are oriented toward the generation of high power densities accompanied by high beam quality and high electo-optical efficiencies.

The main advantages that conventional lasers present over high-power diode or diode-pumped solid-state lasers are:

—higher efficiency (factor of 4-10), i.e., generation of "cheaper photons";

—better beam quality (factor of 2-5);

—longer service life (factor of 10-1,000);

—compacter design (factor of 2-10);

—light transmission via optical waveguides, and

—use of lower electrical voltages.

This technological advance has far-reaching consequences: The advantages listed above make for greater reliability, lower costs, and better-quality results during use, for example, during material processing, the major field of application for high-power lasers. In addition to supplanting conventional lasers, high-power diode lasers will open up entire new spheres of use for the laser, for example:

—process analysis;

—laser-induced chemical processes, and

—color generation for televisions and large-screen displays.

Research projects on the following topics are to have priority:

—semiconductor technologies (material and coating systems, variations on designs for various emitter systems);

—beam control and beam shaping (microscopic fiber systems, holography-based optical components, and generation of high-energy radiation fields);

—packaging (thermal economy, dissipation mechanisms), and

—potential uses for high-power diode lasers.

Key Project: New Physical Working Principles in High-Power Gas Lasers

Semiconductor technology will be able to make little headway in the output range exceeding about 5 kW, so it would currently appear that there will be no alternative to the gas laser in the very high power range, even in the long term. The next generation of gas lasers will work according to new physical principles in order to achieve an extreme reduction in size. A technological advance of this sort requires a considerable amount of basic research on new excitation mechanisms and resonator concepts if the desired high specific power densities are to be obtained. A vision for the future is the operation of high-power lasers on robot arms.

Key Topic: Extension of the Wavelength Range and Acquisition of the Relevant Laser Property Know-How

Basically, only five wavelengths are currently used for industrial laser applications. New wavelengths must be generated if new fields of application are to be opened up and laser-assisted methods and processes are to be optimized. In principle, two different approaches to this task are conceivable, one being to use new laser-active media, and the other being to use nonlinear optical methods for frequency conversion, i.e., new types of laser in conjunction with new working principles. Openings can be seen with iodine oxygen, CO, and X-ray lasers (e.g., by generating inversion states in laser-induced plasmas), and more particularly with new solid-state lasers.

The availability of diode lasers as sources of pumped light and novel laser crystals makes it possible to produce, for example, eye-friendly lasers, tunable lasers, and upconversion systems. Other laser properties, such as beam quality, modulation capability, pulse shaping, and noise attenuation, can be used to exploit new interaction processes between radiation and matter with applications in laser biodynamics, laser medicine, and laser analysis.

This is the basis from which problems can be solved in major fields of application, such as laser medicine, high-precision laser processing, laser-optical measuring and testing methods, and laser chemistry (laser-induced substance conversion).

7.2. Precision Processing With Lasers

As massless and contactless tools, laser photons provide outstanding conditions for the high-precision, inertia-free control of processing procedures. The precision concept comprises both precision in the adjustment and control of all laser process parameters and precision in the end product concerned, for instance its geometry, form, material, and material properties. It would appear possible to acquire a quality lead over conventional material processing methods if the qualities obtainable from the scientific point of view can also be exploited industrially up to their physical limits. In particular cases, therefore, the requisite research work will also entail comparisons with other processing technologies, such as plasma, water-jet, ion-beam, and electron-beam technology.

Key Project: Laser Process Quality Assurance

Compared with conventional processing technologies, the laser uses enormously higher energy densities and correspondingly lower [Streckenenergien]. The resulting higher cooling speeds in particular produce metallurgical modifications and alterations that have not yet been adequately studied in the crystalization and transformation behavior of the materials processed. These transformations in turn create mechanical and technological properties that have not yet been characterized. A better understanding and knowledge of all these aspects is required, as the test methods and forms of sampling available to date have given only an inadequate understanding of them. Measured against the high quality and testing criteria now in force, all laser processing methods without exception fall far short of the standards required for quality assurance and validation and met by conventional processes. These obstacles to introduction have particular repercussions in areas where safety is a major consideration (e.g. structural steel engineering and shipbuilding).

Research projects in the following areas will take priority:

—studies on short-time laser metallurgy and heat treatment;

—characterization of material behavior, including test methods, with drafting of assessment criteria (standards);

—system aspects of short-time laser processes, and

—characterization procedures for laser radiation (test methods, effect of beam quality on the process).

Key Project: Laser-Induced Manufacturing Processes

Deposition With Laser Photons

Surface treatments, and coatings in particular, can substantially reduce wear, abrasion, and corrosion. Conventional electroplating processes cause a high level of environmental pollution, and the coating quality and uniformity that they achieve is not always entirely satisfactory. Laser-photon deposition processes present considerable advantages over conventional methods, for example:

—they can be used with nonmetals, such as plastics and ceramics;

—they provide selective, local deposition onto components only at the specific points where it is needed;

—they achieve higher coating quality;

—active and multifunction surfaces with new physical properties (electrical, magnetic, optical, chemical, etc.) can be produced, and

—they have potential for high deposition rates (high-speed laser coating).

They also make for greater environment-compatibility and improve resource conservation.

Research work is needed in the following areas:

—basic research on laser particle deposition (LPD);

—studies on high-speed laser coating processes;

—new coating systems and studies of their properties, and

—new laser-based optical test procedures for characterizing and measuring coatings.

Milling With Laser Photons (Laser-Aided Abrasion)

In addition to well-established electron and ion beam technologies, laser photons can be used to mill materials into three-dimensional components of any shape and structure. Materials that could previously not be processed, or only with difficulty or by polluting the environment, can be processed with laser beams with a high energy density and high modulation capability. This applies equally to components made in an enormous variety of materials for microengineering uses (down to nanotechnology) and to large-scale components in complex shapes.

The following research projects focusing on laser light in the visible and infrared wavelength ranges are required:

—studies of the basic principles of abrasion processes with a variety of laser parameters and materials;

—application of laser abrasion to new industrial processes and products, and

—comparisons with electron and ion radiation.

Key Project: UV Laser Photon Technology

UV laser photon technology, for example, can play a key role in production engineering with regard to processes that would otherwise not be feasible. The specific feature of UV laser photon technology is the high precision in time and space that characterizes the interaction of UV photons with a wide variety of substances. These interaction processes have not yet been studied adequately, particularly with reference to future fields of application in industry.

There is particular application potential in:

—high-speed microdrilling;

—micromarking;

—microstructuring and surface modification;

—coating and coating system production;

—physical and chemical transformation, and

—surface treatment.

Other major areas of application are to be found in environmental analysis and laser medicine.

Key Topic: Basic Principles of Laser-Based Production Strategies and New System Concepts

On its own, the laser is by no means an adequate tool: It is only by combining it with peripheral devices and integrating it into systems engineering that a high-precision machine tool, for example, can be created. The rising demand for precision and speed as competitive factors in production engineering create the need for systematic basic research, particularly in the following areas:

—laser-based rapid prototyping procedures;

—combined procedures designed to improve process stability and cost-effectiveness;

—systematic analysis of laser beam-based process chains;

—sensor-based processing to enhance precision;

—adaptive electronics and laser engineering, and

—optical waveguide transmission.

7.3. Principles for Opening Up New Fields of Application

Key Project: Laser-Optical Measuring and Testing Processes for Production and Environmental Metrology

Using photons as a high-precision measuring instrument, new measuring and testing processes will be studied and used to replace obsolete mechanical and/or measuring processes in manufacturing metrology, analysis, and environmental metrology, thus achieving higher product quality, which is an increasingly important aspect of international competitiveness.

Product quality assurance requires measuring and testing procedures equal to the task of on-line manufacturing and process monitoring and control, plus 100-percent quality control. In the future, laser-optical quality inspection will be a key to zero-defect production.

Conventional measuring and testing procedures often no longer meet the extremely high demands now set in production and environmental metrology. However, laser-based procedures' precision, speed, flexibility, and above all contactless working principles make them superior to conventional methods. The precision of laser-optical measurement resides in its extreme resolution in space and time.

Areas for future research are:

—laser-optical quality inspection;

—laser-based ultraprecise metrology (e.g. mictrostructure measurement);

—use of laser-optical procedures to measure previously inaccessible quantities and in multicomponent measuring systems;

—laser-optical process monitoring and control procedures, and

—process analysis and monitoring using laser-optical methods.

Key Topic: Nonlinear Optics

Nonlinear optics (NLO) is a cross-sector technology with a wide-ranging impact on numerous areas of laser technology application, e.g., in developing new wavelength ranges and compacter laser beam sources. The importance of nonlinear optical processes and components will thus increase greatly in the future, many of the potential applications being only barely discernible at the present time.

NLO has been the subject of widespread basic research to date, and to some extent it has already been exploited. The funding measures set out to promote research into the capacity of specific aspects of NLO for industrial conversion and, more particularly, to extend its performance range to levels at which it will have industrial relevance.

Economic significance here lies not so much in the market for the various nonlinear optical components as in the wide variety of problem amd system solutions that NLO makes possible and in the system market.

Funding will focus on:

(a) Frequency Conversion: methods and components for generating new application-relevant wavelengths, ranging from the ultraviolet (UV) to the infrared range (e.g., parametric amplification, frequency multiplication and mixing (up-conversion];

(b) Beam Shaping and Manipulation: generation of ultrashort light-induced pulses, mode coupling, modulation, phase conjugation, coherent coupling of laser radiation;

(c) Nonlinear Optical Procedures and Components for High-Precision Measurement and Testing: surface and interface analysis (surface harmonic), process analysis, optical signal preprocessing for precision measurement.

Key Topic: Laser Biodynamics

The relatively new term "laser biodynamics" is used to cover the use of lasers in biological systems, particularly at cell and biological macromolecular, e.g. DNA [deoxyribonucleic acid], level. Light, as an energy source, for example, is of fundamental importance to biological processes. Laser biodynamics sets out to combine laser engineering and biological systems, and above all to acquire a better understanding of the dynamics of biological processes and make it possible to exploit them for industrial purposes. In particular, it is the extreme resolution of laser light in space and time and its capacity for manipulation that are the salient features here.

The following topics for future research may be cited as examples:

—laser microprocessing of biological cells and biomolecules using optical tweezers;

—DNA analysis by isolating DNA fragment sequences using UV laser photons;

—study of the molecular dynamics and kinetics of biological processes using short-time laser spectroscopy;

—detection of biomolecules in clinical diagnostics and environmental and food analysis (optical biosensors), and

—elucidation of the process of photosynthesis.

7.4. Laser Medicine

A revolutionary change is currently taking place in medicine. many long-established surgical practices are being supplanted by new "minimally invasive therapy" techniques, the main feature of which is to minimize surgical intervention. They combine laser-based and endoscopic techniques, resulting in, for instance, the "optical scalpel," which can be used to operate even internally (tissue cutting and coagulation) with minimum loss of blood and high precision. In addition to this therapeutic use of the laser, new applications for medical laser engineering can be opened up in areas such as diagnostics, analysis, tumor diagnosis and treatment, and optical tomography ("optical X-rays").

The purpose of these research projects is to reduce patient stress (low-impact surgery), make operations safer, and not least to shorten hospitalization and convalescence times.

Key Project: New Laser Concepts for Medical Engineering

The growing demand for quality in health care and greater therapeutic reliability for both the medical profession and the patient increasingly require intelligent therapeutic systems. Combining laser engineering with sensor analysis and advanced fiber technology makes on-line diagnosis and analysis possible.

The primary focus of the following proposals for preventive research projects is on interdisciplinary cooperation among several different branches of technology or research fields (system integration). Moreover, new fields of application for minimally invasive therapy (MIT) will be identified and existing MIT processes refined.

Interstitial Laser Applications

Interstitial laser applications set out to beam controlled doses of radiation energy innocuously into tumor tissue, thus destroying the tumor. Radiation energy can be used directly, the heat applied nectrotizing the tumor.

Another possibility consists in sensitizing the tumor to laser radiation by administering certain reagents so that radiation triggers phototoxic reactions, destroying the tumor.

Research projects should be directed toward:

—defining the laser-tissue effect (optical tissue properties, optimized sensitizers (pigments) and carrier systems giving better tumor selectivity), optimizing laser beam sources;

—application and catheter systems, laser-aided diagnostics, and image-generating procedures, and

—treatment planning, process control (appropriate dosimetry), control of the therapeutic system.

Photoabrasion Processes

Research here focuses on new systems suited to medical requirements, in which new wavelengths in the near-infrared spectral region will be opened up for photoabrasion processes that will make it possible to adjust them more effectively to different types of tissue. Goals such as compacter, robuster, and cheaper systems will also be borne in mind.

Research projects on the following topics are needed:

—adaptation and optimization of laser beam sources for medical purposes;

—short-pulse and clocked laser beam sources and the associated application systems for optimizing existing and new forms of therapy;

—sensor-based diagnostic procedures for on-line detection of tissue modifications, new measuring systems for gauging abrasion rapidly and accurately, and

—the development of new areas of application for minimally invasive therapy.

Key Project: Optical Tomography

Optical tomography (which uses laser radiation instead of X-rays) works with pulsed laser radiation in the visible and infrared range. In the future, it could supplant certain X-ray technology applications, which entail a risk to patients in particular on account of the shortwave radiation used. This will require extensive work on the underlying scientific and technical principles, for example, studies on tissue-optimized optical tomography procedures and trials with in vitro applications. Laser-optical procedures such as fluoroscopy, which is used for early tumor detection or for metabolic disturbance analysis, will also be studied.

Research projects in the following areas are needed:

—basic studies on optical tomography and tumor diagnostics;

—laser-optical diagnostic procedures (fluoroscopy);

—sensory analysis and metrology for the above procedures, and

—system configuration (modeling, simulation, scaled design, image processing).

Key Topic: Transmission Systems

The endoscopic method of operation involves using the laser as a medical instrument integrated in a complex system consisting of beam guiding, shaping, and handling systems so as to be able to convey the laser radiation deep inside the body. The development of new wavelengths, particularly in the near infrared range, means that new optical waveguide technologies must be researched for endoscopic procedures, bearing the requisite safety levels in mind.

Areas for future research work are:

—new optical waveguides;

—beam shaping, indication-specific applicators, sensor integration, use in conjunction with medical instruments, such as ultrasonic devices and the nuclear magnetic resonance process (system integration).

Key Topic: Dosimetry in Laser Therapy

Dosimetry has reached a high technical level in conventional forms of radiation therapy (e.g., X-ray medicine), but it is still at the basic research stage in laser therapies. The goal is therefore to investigate dose and effect in laser therapy and the dose-metering procedures that will allow the course of treatment to be assessed objectively and the laser beam parameters to be adjusted so as to optimize the therapy.

Research projects are to be oriented toward:

—the principles underlying the working mechanisms of laser radiation in biological tissue (biophysical properties of tissues and their dynamic modification under radiation);

—on-line beam source control procedures, and

—dosimeters and their system integration.

Key Topic: Medical Laser Analaysis and Laser Diagnostics

The potential of the laser as a medical laboratory instrument has not yet been adequately exploited. The range of potential uses of the laser for diagnosis and analysis purposes extends from interferometry and holography (e.g., growth processes, three-dimensional microscopy), via fluorescence-excitation processes (e.g., cell sorting, receptor diagnostics), to ultrashort-time diagnostics (time-resolved laser fluorescence diagnostics for metabolism monitoring).

Once new medical laser analysis and diagnosis methods are available and in use, time-consuming conventional analysis and diagnosis processes can be abandoned and accuracy substantially increased.

Research work is required in the following areas:

—tissue differentiation for diagnostic and therapeutic purposes;

—matabolic product monitoring;

—work on photodynamic diagnostics, and

—elaboration of laser-specific measurement and analysis methods for laboratory use.

8. Innovative First-Time Applications of Laser Technology in Small and Medium-Sized Enterprises

8.1. Simplified Funding Procedure of Limited Duration for Small and Medium-Sized Enterprises (SME-Oriented Measure)

SME's can and will participate in the key projects and key topics set out in the previous chapter. This is a research policy goal, particularly as SME's play a crucial role in innovation in the German economy, including the laser field.

Nevertheless, participation by SME's in precompetitive joint projects lasting several years makes great demands on these businesses and cannot usually be reconciled with their sphere of interest and their approach to innovation, which tends to be oriented toward the short-term conversion of R&D results into products. The Ifo survey also comes to this conclusion, establishing, moreover, that the huge application potential of the laser means that laser and laser system producers have neither the funds nor the staff to open up the market in its entire breadth. The measure described below sets out to address these issues.

Under previous funding schemes for laser research and laser engineering, the various potential applications for industrial lasers (CO_2, solid-state, and excimer lasers) had first to be studied right from the very principles underlying the processes. As a result, the basic knowledge for conventional laser applications (cutting, welding, surface treatment) is generally available. However, there are still numerous obstacles to their practical introduction on a broad scale, particularly in the overwhelmingly SME-based user industry. One of the reasons is that, despite the availability of knowledge as to the fundamental principles behind the process in any given application, the introduction of lasers into the individual enterprise requires R&D work that often proves highly innovatory, costly, and time-consuming. This finds expression in the still low adoption rate for laser applications, which does not exceed 30 percent, even for cutting.

In order to do away with the remaining obstacles to innovation (particularly technical problems and knowledge barriers), SME's will be encouraged to adopt laser technology for innovative purposes by "a simplified funding procedure under which businesses will work alongside contractors, particularly research institutes." The research infrastructure created during the first period of funding and the process principles worked out in the course of the joint projects on laser applications form a crucial basis for the implementation of this measure, which will be limited in terms of budget and duration (see chapters 11 and 12).

The incentive for innovative widespread use of laser technology that this SME-oriented measure sets out to provide also complements the BMFT's general funding programs directed exclusively at SME's, such as:

—R&D loans for advanced innovations, and

—funding for joint research projects.

8.2. Testing and Advisory Centers

The infrastructure available, for instance at university and nonuniversity research institutes, for the implementation of the SME-oriented funding measure is ready, subject only to the initiation of the contracts concerned. The staff and equipment in particular for first-time introduction and technical consultancy work are not yet in place. The testing and advisory center scheme is designed to create the requisite facilities at selected points distributed evenly throughout the various regions. Centers with different specialties and structures will also be set up. These centers will have to work closely with private consultancy services in order to avoid distortions in competition.

9. International Cooperation

International cooperation and work-sharing is essential in the further development of laser engineering, especially against the background of the single European market launched in 1993. Important facilities for the international networking of the western European laser research scene have been created to date in support of the Eurolaser projects that form part of the EUREKA [European Research Coordination Agency] technology program. Certain topics can only be addressed effectively in a context of international cooperation; this applies, for instance, to R&D work on standards and regulations.

The Laser 2000 funding program will therefore also support international cooperation on selected suitable topics. It will be decided on an individual basis which funding channel (EC, EUREKA, or bilateral cooperation) is most appropriate in each case. In the future, it is also planned to initiate and expand cooperation with central and eastern European countries (particularly the CIS) as an extension of the intensive joint work undertaken to date with western Europe.

10. Supporting Measures (Transfer of Knowledge and Findings, Technology Impact Assessment)

The effectiveness of R&D project funding can be substantially raised by supporting measures designed to back up the research. For instance, the transfer of knowledge and findings acquired in the projects funded can be boosted by disseminating them in the form of presentations, workshops, brochures, etc., in addition to the usual final reports. Particular attention should be paid to the relevant associations, which can increase the effect, for instance by providing appropriate material.

The following major measures in support of technology-oriented funding will be carried out:

—technology impact assessments;

—transfer of knowledge and information, and

—support for keeping standardization abreast of development.

The research on technology impact assessment begun to date under the first stage of funding (training and further training and laser safety section) is to be continued. The priority in future will lie with the system aspect of laser engineering with reference to ecology and the organization of work (e.g., strategies for industrial production in the 21st century, or system structure analyses as bases for human-oriented concepts of work organization).

11. Timescale and Financial Planning

11.1. Timescale

A five-year term is envisaged for the implementation of the program. This timeframe depends primarily on the requirements of joint research projects, for which at least four years have to be allowed, preparatory stage included.

The program will be assessed in two stages: simultaneously with implementation from 1994 onward, and partly in retrospect from 1996.

11.2. Financial Planning (Status: January 1994)

Current budgetary and medium-term financial planning has earmarked the following sums to fund laser research and laser engineering under the Laser 2000 funding program from 1993 through 1997:

—1993: 2.3 million German marks [DM] (actual)

—1994: DM66 million (projection)

—1995: DM69 million (projection)

—1996: DM69 million (projection

—1997: DM69 million (projection).

This total of about DM275 million will cover the implementation of technology-oriented R&D projects, SME-oriented measures, including the testing and advisory centers, and supporting measures designed to place laser engineering in Germany in a leading position in the 21st century as well. The budget for the SME-oriented measure envisages funds increasing to at least DM5 million a year (about 25 projects per annum), commencing in 1994. The resulting division of funding, expressed in millions of German marks, is as follows:

—key topics, including supporting measures and testing and advisory centers: 2.3 in 1993, 64.0 in 1994, 64.0 in 1995, 64.0 in 1996, and 64.0 in 1997 for a total of 258.3;

—initial applications in SME's: nil in 1993, 2.0 in 1994, 5.0 in 1995, 5.0 in 1996, and 5.0 in 1997 for a total of 17.0, and

—totals: 2.3 in 1993, 66.0 in 1994, 69.0 in 1995, 69.0 in 1996, and 69.0 in 1997 for an overall total of 275.3.

12. Funding Channels, Conditions for Funding, Administration

12.1. Funding Channels

The continuing development of laser engineering will require interdisciplinary cooperation and the exploitation of synergies in the future as well. The main channels for technology funding will therefore be joint industrial research and, for basic projects, research consortia.

The SME-oriented measure (contract R&D) will be implemented in the form of single projects in favor of SME's (annual revenue up to DM200 million). Separate funding guidelines govern the details of such schemes. An appropriate level of self-support will be expected when funding testing and advisory centers. Detailed information on both measures will be given in an announcement or a guideline that has yet to be published.

12 2 Conditions for Funding

Project funding levels are laid down in Article 92 of the EC Treaty in conjunction with the EC Commission's "Common Framework for State R&D Subsidies" and the EC Commision's administrative practice, according to which the funding levels for joint industrial research are:

— up to 50 percent for basic industrial research, and

— up to 25 percent for applied research.

The funding rate may range from 25 to 50 percent according to the proportion of applied or basic industrial research involved. University and other comparable institutes that charge according to expenses may be awarded grants of up to 100 percent for joint industrial research.

The total share of state funding may in no case exceed 50 (or 25) percent of overall costs.

Work funded in the new federal laender may be allowed an additional bonus of up to 10 percent (initially for applications granted by 28 February 1996). Enterprises with no more than 250 employees who achieve annual revenue of no more than ECU20 million or a balance-sheet surplus of no more than ECU10 million and are no more than 25-percent owned by a major company may be allowed an additional funding preference of 10 percentage points (see Common Framework for State Subsidies to Small and Medium-Sized Enterprises). This preference may be added to the bonus for R&D in the new federal laender provided the sum does not exceed 15 percentage points.

In principle, 100-percent grants are awarded for basic research projects performed at universities and nonuniversity institutes under the research consortia scheme.

Funding is subject to the Federal Ministry of Research and Technology's Principles of Project Funding, with particular reference to the General and Specific Ancillary Regulations Governing Grants for Expense-Based Project Funding and/or the Ancillary Regulations Governing Cost-Based Grants to Private Enterprises for Research and development Projects.

Funding levels ranging from 25 to 40 percent, depending on the size of the business and its ownership (new laender), are envisaged for the simplified funding procedure (SME-oriented measure), the ceiling for grants being DM0.2 million each. Further details are set out in the funding guideline.

12.3. Administration

The program will be run by the BMFT's project manager: VDI [Association of German Engineers) Technology Center Physical Technologies Department Graf-Recke-Str. 84 40239 Duesseldorf Tel. (0211)6214401, Fax (0211)6214484.

APPENDIX

1. Other Funding Measures Involving Laser Research and Laser Engineering

The federal and land governments and the European Community (EC) support laser research and laser engineering in a wide variety of ways.

Laser-specific measures relevant to the goals of the programs or projects concerned feature in BMFT programs or schemes on subjects such as medical research, photonics, and biology. This work is carried out either in conjunction with the laser topic or with clear delimitation and strict coordination between them.

1.1. Cooperation and Coordination With Other BMFT Projects

Cooperation is required and desired between projects in which laser or laser system developments and applied research complement one another and create synergies. This applies particularly to the following areas:

—laser medicine/minimally invasive therapy;

—laser biodynamics, and

—lasers for environmental metrology.

Laser users are defining their requirements for further developments, for example in beam sources and/or systems, in the course of intensive harmonization processes, while laser research is enhancing the potential of laser engineering. Cooperation between the two groups extends from commissioning studies through organizing technical seminars to the funding of joint projects together (see chapter 7).

Intensive coordination and clear delimitation are central to such projects, which support independent laser-related R&D projects for the specific purposes and goals of the program concerned (e.g., photonics, laser-aided microsystems engineering, large-scale basic research facilities), or where R&D projects from other programs can contribute factors of importance to the further development of laser engineering (e.g. materials research and plasma technology):

—In photonics, III/V-semiconductor based diode lasers are needed for optical data transmission and processing. They are characterized by comparatively low outputs and a high modulation frequency and bandwidth. On the other hand, the R&D on diode lasers under the new Laser 2000 funding program is directed toward diode lasers in the high output range with decidedly lower switching and pulse frequencies. The potential synergies arising from the two programs (e.g. basic III/V technology) are being exploited to the full;

—In microsystems engineering, the focus is on exploiting the advantages of miniaturized components and using structural and bonding techniques to integrate them. It is thus useful exploit the potential or miniaturization methods to develop specific laser techniques on a work-sharing basis under the microsystems engineering program. This applies, for example, to projects such as "new sensors and activators for laser processing of materials" and "miniaturized diode-pumped solid-state lasers."

—Large-scale facilities based on laser techniques, e.g., free electron lasers (FEL's) and the laser-based [Gravitationsweiten] experiment, are needed for basic research in the natural sciences. These large-scale facilities are used, for example, for experiments in atomic, molecular, and solid-state physics (FEL's) or for studying cosmological matters (GEO). Synergies resulting in, for instance, the special development for high-precision metrology using the diode-pumped solid-state laser designed to study gavitational waves are being exploited to mutual advantage;

—The development of new materials (e.g. crystals for solid-state lasers) in materials research can be of benefit to laser engineering. Conversely, new laser processes are being used to produce, characterize, and process materials with new service and manufacturing properties;

—New developments in plasma technology (high-power gas discharges) are improving major properties, such as output and beam quality, in gas lasers (CO2, CO, and excimer lasers). Knowledge transfer between these areas is organized at the project level.

Moreover, laser engineering is being used in numerous BMFT funding programs to achieve the goals set for the respective projects, as certain problem and system solutions can only be achieved by using laser beam sources. This applies, for example, to the production of high-termperature superconducting layers and fullerenes. However, there are also programs, such as microelectronics (deep UV-lithography), solar power (photovoltaic thin-film technology), and power station technology (laser metrology for technical flames), where the projects are using commercial lasers or adapting available laser developments to their own purposes.

The lasers needed for space applications (e.g. satellite communications via solid-state lasers, and climate and atmospheric research using lidar [laser infrared radar]) are usually not commercially available, nor can they be produced for these applications by modifying [commercial lasers]. Special developments are needed here to take account of the specific requirements arising from use in space.

1.2. Funding Arrangements Provided by the Laender

Since the mid-eighties, some laender have been making efforts, often on a considerable scale, to build up a regionally balanced laser engineering research infrastructure.

Pursuant to the provision for joint research funding by the federal and land governments embodied in Article 91b of the German constitution, the Max Planck Institute of Quantum Optics in Garching, the Fraunhofer Institute of Laser Research in Aachen, the DLR [German Aerospace Research Institute] Institute of Applied Physics in Stuttgart, and, in the new laender, the Fraunhofer Material Physics and Coating Technology Facility in Dresden and the blue-list Max Born Institute of Nonlinear Optics and Short-Time Spectroscopy in Berlin have been established.

As a rule, moreover, the trade and industry ministries of individual laender have founded nonuniversity research institutes and financed them via booster and project grants. Suffice it to mention here the Hannover Laser Center (LZH), the Bremen Institute of Applied Radiation Technology (BIAS), the Solid-State Laser Institute (FLI) in Berlin, the Laser Medicine Center (LMZ) in Berlin, and the Institute for Laser Technologies in Medicine (ILM) in Ulm. The laender have also created quite large laser research departments at some universities, such as Duesseldorf, Erlangen, and Stuttgart.

The federal-land facilities referred to above have thus been complemented by other institutes with an industrial R&D

orientation; this also finds expression in the contribution that industry makes to the founding and financing of nonuniversity institutes.

1.3. Funding by the German Research Association (DFG)

The DFG funds basic research on a few specific laser science topics under four concrete measures:

—the "Beam-Substance Interaction During Laser Beam Processing" program;

—the 349 (Stuttgart) special research area entitled "Highly Dynamic Beam Control and Beam Shaping Devices for Three-Dimensional Laser beam Processing";

—the 94 [Goettingen] special research area entitled "Photochemistry With Lasers," and

—the Nonaspherical Laser Optics research team (Aachen).

The DFG is currently contributing about DM7.5 million per annum to these predominantly knowledge-oriented research projects.

1.4. Funding by the Commission of the European Communities

Under the 1990 to 1994 Third EC Framework Program, laser engineering projects are mainly being funded under the "Program of Research and Technological Development in Industrial and Materials Technologies" (BRITE-EURAM). The main goal that the EC is pursuing in this joint research program is to strengthen the scientific and technological foundations of European industry, particularly in strategic areas of leading-edge technology, and to support industry and make it internationally competitive.

Within the BRITE-EURAM program, laser-related projects are concentrated in section two, "Design and Manufacturing," where the EC sets out to achieve the following goal:

—The development of innovative tools and techniques for high-quality, inexpensive production systems designed to improve process control and raise precision and processing speed, and the integration of new processing technologies with tried and tested manufacturing processes.

The following research work is being carried out:

—development of inexpensive manufacturing processes, such as cutting, grinding, shaping, bonding, and cementing to raise productivity, quality, and precision;

—development of inexpensive high-energy beam processes, waveguides for beam-generation systems, and the associated acoustic and optical test methods.

Basically, the EC is currently spending about 5.5 percent of the budget, i.e., around ECU17.5 million, on these laser-related projects. In comparison with the broad potential for laser use, this covers an important, though relatively limited area of application. Three-quarters of the projects carried out under phase two of BRITE-EURAM have economic potential, in other words they aim at new markets and/or improvements in productivity. The EC measures contained in BRITE-EURAM will be continued under the 1994-1998 Fourth Framework Program, where the emphasis will be on "new industrial applications for laser engineering."

Projects relevant to Laser 2000 measures are being carried out only to a minor extent in other EC programs. The "Measuring and Testing" (BCR) program, in which lasers are mainly being used or further developed for meteorological purposes (particularly calibration and standardization) is worth mentioning in this connection.

EC laser project funding thus complements the Laser 2000 measures in limited areas—from the subsidiarity point of view as well—especially in cases where cross-border cooperation on industrial development projects appears useful.

There is intensive information exchange between the EC and the EUREKA technology program regarding the funding of laser projects: Coordination is provided by the Eurolaser Governmental Coordinating Committee (GCC), of which the EC Commission's Directorate General XII is a member. At regular intervals of about two years, the EC, together with the host country concerned (Germany in 1993), organizes a conference for all those involved in EC or EUREKA laser projects.

2. Contribution Made by Federal-Land Laser Research and Engineering Facilities to the Funding Program

The BMFT, in conjunction with the host laender, supports laser research and engineering via institutional funding of both basic and applied research-oriented nonuniversity research facilities. The applications-oriented institutes of the Fraunhofer Society and the DLR, as a major research establishment, are particularly involved in the work being done under this program. The following deserve special mention:

—the Fraunhofer Institute of Laser Engineering (ILT) in Aachen, which focuses on laser material processing, laser beam sources, laser system technology, and laser metrology;

—the Fraunhofer Material Physics and Coating Technology Facility (IWS) in Dresden, which focuses on surface treatment with lasers, laser thin-film technology, and aspects of materials science, and

—the DLR Institute of Applied Physics (ITP) in Stuttgart, which focuses on high-energy lasers and their applications, and on solid-state laser technology.

A substantial part of the DLR ITP's basic financing comes from the Federal Defense Ministry's budget for specifically defense-related work.

Other institutes funded jointly by the federal and land governments mainly cover basic aspects of laser research. Chief among them are:

—the Max Planck Institute of Quantum Optics (MPQ) in Garching, which focuses on the interaction between light and matter, new laser systems and their applications to spectroscopy, chemistry, plasma physics, and quantum optics, and

—the Max Born Institute of Nonlinear Optics and Short-Time Spectroscopy (MBI) in Berlin, a blue list facility

that focuses on short-time spectroscopy on clusters and interfaces, strong laser fields and excited states, and nonlinear optical processes in condensed matter.

Overall, with these federal-land research facilities, including the university centers and nonuniversity institutes built up by the laender (see Appendix 1.2), the Federal Republic of Germany has an international-level laser research and engineering infrastructure that covers almost all aspects of laser engineering. Its scope and human resources must basically be in line with the needs and means of laser manufactrers and users in private industry. As a considerable proportion of the institutes have to be financed by industrial contracts, it is difficult to say how large this state research infrastructure should actually be, but in this connection, and in view of the emerging trend toward saturation on the contract research market, the Federal Government currently sees no need to set up further jointly funded research institutes within the meaning of Article 91b of the constitution. Existing facilities must adjust in size to the state's limited capacity to provide basic financing, and, moreover, earn more of their funding than before from third parties, in particular from industrial contracts. This will also contribute to technology transfer from science to industry.

Germany: Riesenhuber Interviewed on R&D Prospects

BR1404100794 Bonn DIE WELT in German 28 Feb 94 p 7

[Interview with former Federal Research Minister Heinz Riesenhuber by Wolfram Baentsch and Norbert Lossau; "Yesterday's Successes Are Today's Problems"; first paragraph is DIE WELT introduction]

[Text] Bonn's decision on the Transrapid magnetic levitation railway is imminent. "The industry has submitted a clever financing plan," former Federal Research Minister Heinz Riesenhuber (CDU [Christian Democratic Union]) told DIE WELT. "Now it is up to the government to create the framework conditions." Will Europe be able to catch up in the technological rivalry with Japan and the USA? Has Germany missed the boat in genetic engineering? Wolfram Baentsch and Norbert Lossau talked to Heinz Riesenhuber.

Baentsch/Lossau: You have been the Federal Chancellor's adviser on scientific cooperation with Japan and the USA for more than a year now. You might be said to be the government's expert on the triad. How do you rate Europe's chances of holding its own in the global competition within the triad?

Riesenhuber: Our economy is faced with several problems at the same time: The mark is still strong. The world economic situation is still difficult, despite encouraging figures from the USA. The boom from German unity has expired. And at the same time we are being overtaken by the need for far-reaching structural change. In the eighties we were very successful: For years we topped the world league table for exports. But while our exports to Europe, of technical goods in particular, were continuing to rise we failed to be so determinedly committed to the USA or to the fast growing markets of Asia.

Our strength lay in sophisticated technology with a research content, according to OECD [Organization for Economic Cooperation and Development] definitions, of 3.5 to 8.5 percent of the cost of the products. Sales were going so well that many firms delayed developing state-of-the-art technology with a much higher research cost. Thus the successes of the eighties were the foundation for our present problems. We were too sure of our own ability.

Baentsch/Lossau: So many people were lulled into a false sense of security ...

Riesenhuber: ...And now we are having to rethink our position. Because we were so successful in Europe and in many fields had an intelligent technology, we were not prepared to take new strides. Now we are paying the price: High labor costs, highly strained financial budgets and social security systems, rising unemployment. A painful situation. But at the same time, I can see prospects of matters we were unable to resolve in the eighties suddenly becoming open for discussion and a decision being reached. This ranges from the question of the internal structure of the universities to that of company organization, from research strategy to the removal of obstacles in licensing procedures, the legislative process, and the enabling of the transport acceleration law.

Baentsch/Lossau: So in these days of crisis where do you think our strengths lie?

Riesenhuber: Our strengths lie, for example, in an excellent transport infrastructure in a decentralized country with many competing centers. The new situation with a united Germany has made this better, not worse. We have an unusually varied education system. A variety in science even in the competition between different paradigms—the Max Planck Society thinks differently from the Fraunhofer Society. The Max Planck Society starts from the splendour of science and the Fraunhofer Society from the question: What can I make from it—new products, manufacturing processes, or even forms of factory organization? Then there are the universities, large research establishments, and industrial laboratories: Diversity is our strength.

Where the State Must Hurry

Baentsch/Lossau: So why, in this flowering scientific landscape, do so many things seem not to happen, or if they do, then very, very late?

Riesenhuber: Our industry was not always very quick at making use of new knowledge. To do this, the government and industry must work together to facilitate innovation in important new technologies. Transrapid is an example of this. This technology cannot get moving until government authority takes the necessary decisions about routes. The industry has put forward a clever and balanced financing plan. Now it is up to the government to create the framework conditions and ensure that planning approval procedures go ahead swiftly. I think everyone now understands that time is of the essence.

Baentsch/Lossau: Looking back to the eighties: How ought research ministers perhaps to have prepared the ground differently?

Riesenhuber: The government is responsible for basic research. We have got on well there. Eleven Nobel prize winners since 1984—as many as between then and the early fifties—are not something the state can take the credit for but evidence of the high quality of our science. Among technologies where the government sets the parameters I can think of the car telephone, the ICE [Inter City Express train], broadband technology, or the standards for high-definition television.

Baentsch/Lossau: You are an optimist and characteristically you mention the positive cases. But there are others as well.

Riesenhuber: I consider the unpleasant development of nuclear technology in the eighties a fundamental mistake. People speak with passionate admiration of the far-sighted technology strategies of the Japanese. A country with no natural resources, but with intelligent human beings. Undaunted they quickly build their 300 Megawatt reactor, very similar to the Kalkar fast breeder. This is the point where our prospects in Germany are damaged by excessive timidity.

What Politicians and Industry Have Overlooked

Baentsch/Lossau: What are your views on physics Nobel prize winner Carlo Rubbia's recent proposals for a thorium nuclear reactor?

Riesenhuber: It is quite an interesting idea. The German THTR was a thorium high temperature reactor. The idea of using thorium instead of uranium makes sense. But I would hesitate a lot before recommending a completely new type of reactor at the moment. I think Siemens' approach of developing a highly-optimized system based on the existing family of reactors is more sensible. It does not require the major innovative steps of a new system. If two or three new reactors could be ordered and sold every year, then we could talk about developing a new type of reactor.

Baentsch/Lossau: Was genetic engineering rejected by large sections of the population for the same reasons?

Riesenhuber: I would make something of a difference there. Nuclear power was destroyed by the debates of the seventies. Politicians and industrialists failed to see that people were affected by a completely new dimension of personal anxiety: Hiroshima and Nagasaki were in the background. They failed to see that there was at grass roots level a deep concern about a new dimension of irreversible damage to the world: On the one hand demonstrations against nuclear weapons, "Fight the atomic death," nuclear nightmares, and on the other hand worldwide enthusiasm for a great force of inexhaustible energy for all times, cheap, available, replacing raw materials by technological intelligence.

This debate was never resolved. With genetic engineering it was different. Before it was perceived as a threat in public debate, scientists had long since analyzed the risks precisely. In 1975 scientists from 17 countries got together and said what, under unfavorable circumstances, the risk might be: Admittedly we don't know everything, but if we take the most pessimistic assumption in every area where we are not entirely certain, then this and this might happen. In addition, what must be done to prevent it. This gave rise to a code of honor, quite unique in the history of science. And it gave rise to guidelines. In this country the guidelines of the Central Commission for Biological Safety. So there was a good debate among experts. But we failed to convince the scientists to come out for the matter in public.

Baentsch/Lossau: Has Germany missed the boat in genetic engineering?

Riesenhuber: The amended law that is now in force creates the necessary conditions. We now have many capable scientists who want to get to work. We have a considerable competence in the field. The crucial difficulty is that now, when things should be taking off, the chemical industry is in a difficult situation and finding it difficult to launch into something new.

Baetsch/Lossau: Hoechst tried for 10 years to produce insulin by genetic engineering and failed. Then they went to France. Germany now gets supplies of genetically-engineered insulin from there.

Riesenhuber: I know the sad story. It is heartbreaking. Our unwieldy licensing system has a lot to answer for. When everything was going so well for us all, we thought we could afford having things take longer. The old factory inspector with a sound competence for licensing procedures has been replaced by people who have to hedge themselves on all sides because they are not quite sure how their masters stand politically. The problems come in the enforcement, which is the responsibility of the laender, not primarily from the law. The constitutional state now risks degenerating into a state of appeals. The problem is this: If you feel at ease in a situation, the status quo carries far more weight than the excitement of new opportunities. And this is becoming the prevailing attitude in society, politicians included.

Baetsch/Lossau: Haven't our politicians and industry long since given up on the matter?

Riesenhuber: It looks that way at the moment, but it can and must change.

Baetsch/Lossau: You consider the Transrapid magnetic levitation railway a promising technology. Haven't its supporters failed to really demonstrate its advantages, for example marking out a vision of a country without domestic air services?

Riesenhuber: Of course we have such visions in mind, but you have to think carefully what is achievable. Ex-Prime Minister Ernst Albrecht wanted to build the Hannover-Berlin line, but I advised him against it at the time. I said he shouldn't push Transrapid so hard, we weren't ready for it yet. But it was a splendid vision: Hannover-Berlin and then later Warsaw-Moscow. Then things went as I feared they would. The public was simply not ready. Transrapid was at best mocked as a crackpot idea.

Baetsch/Lossau: Wasn't it also the fault of the so-called objective experts, who failed to present Transrapid's qualities properly?

Riesenhuber: It is a totally new system. It does not fly like an aircraft, and it doesn't roll because it hasn't any wheels. It is something quite different. So the Bundesbahn [Federal Railway] and the Transport Ministry had first of all to identify with this new technology and create a basis for its use. Then there was cooperation with the German Federal Railway Central Office, and finally confirmation that Transrapid was ready for use. That was one basis. The other question was: How to find the routes.

Transrapid Creeps Quietly into Town

Baetsch/Lossau: And where are we at today?

Riesenhuber: First, we developed a careful and clever financing plan. Everything I hear from the two ministries involved—transport and research—indicates that the financing scheme is regarded as sensible and acceptable. There were people who in the first year of this legislative period advised me to kill off the Transrapid project. They said it was a non-starter. They said it had no place in the overall environmental debate, whereas now everyone knows that Transrapid is less damaging to the environment and quieter than any other means of transport. Because it hovers, it doesn't roll. There is no wheel noise at all. The only sound is a speed-related hissing noise.

Baetsch/Lossau: And what do you say to the objection that it requires a completely new track network alongside the railways?

Riesenhuber: It is true that Transrapid cannot run an a railway line. But, after all, the TGV [high speed train] in France, so much vaunted here, also has its own network of track. We have our universal rail system. It carries freight trains as well as the ICE. But the TGV's success is based precisely on its independent track. And here in Germany we have basically not yet taken the opportunity of building a second network in the "rail system."

Compatibility at the end, in other words changing trains, is relatively uncritical on the Hamburg-Berlin route, because it is in reality the one route in Germany with the most point-to-point traffic. Transrapid will creep quietly into the cities—it will not be heard. Compared to all other transport systems that is a blessing.

Baetsch/Lossau: Transrapid could be brought into the city center on combined tracks capable of carrying both conventional trains and the hovering Transrapid.

Riesenhuber: That is technically possible. But so far as I know there are no definite plans to do it.

Baetsch/Lossau: Do you get the impression there is resistance to it from Lufthansa?

Riesenhuber: I don't think so. Lufthansa now sees where its own interests lie. With regional traffic taking up more and more air space and even a rapid take-off and landing sequence failing to get all the traffic airborne, Lufthansa should be very interested in Transrapid linking airports.

Baetsch/Lossau: Does Transrapid also have a message for you?

Riesenhuber: Yes. Something with which we can say: We can do it, we want to do it, we shall do it. To show that something is happening, that we are very good at something important, that we are getting to grips with the problems and concerns, and that we have good answers. Something to show that we in Germany have a very sophisticated technology. An important technology solving a problem in a changing world. The number of cities with over a million inhabitants will increase rapidly. That means powerful markets, solutions to problems, infrastructure. Something about which we will in the end be able to say: Friends, we have made a small contribution.

Baetsch/Lossau: Does this community need pride in a particular achievement, and does it deserve such pride even if there is doubt?

Riesenhuber: We need pride in achievement and the will to get there together. The way in which businessmen are today working in their companies, in which works councils are working with their partners in management—trade unions and employers' associations in collective bargaining in the chemical industry, for example—is an enormous achievement, scarcely imaginable three years ago. Precisely in the difficult situation in which we find ourselves we are managing to remember the strength that lies within us.

Baetsch/Lossau: What potential is there in environmental technology?

Riesenhuber: In good years we had a world market share, all products together, of 11 percent. In environmental technologies today we have a world market share of 21 percent. This itself shows that technological success and innovative strength are not in conflict with the intent of mastering risks. Environmental protection laws can be a challenge to new technologies, new technologies may require environmental protection laws. If there is a close interplay between the two, that is a major contribution to a culture and an opportunity for new markets.

Baetsch/Lossau: What you describe there is a beautiful utopia. Does it not presuppose a consensus society such as the Japanese have, for example?

Riesenhuber: Japan has developed a very self-contained technological culture. I have a great deal of respect for that achievement. Our way will be different. We set more store by the initiative and entrepreneurial spirit of the individual. We cannot copy the Japanese. What this means for our companies, those companies and the people working in them must decide. But what is clear is that an understanding of technology must extend beyond the companies involved to the man in the street if it is to develop quickly and successfully. That the debate for an energy consensus was not successful is detrimental to our future prospects. If nuclear technology or genetic engineering is rejected out of political motives, it will be hard for citizens to find confidence in them. We have the highest safety and environmental protection standards. But then all responsible persons must work to see these technologies put into use in Germany. Otherwise we will lose not only markets and prosperity, but also the chance to bring our high standards into the environmental discussion outside of Germany.

Rediscovering the Strength for the Offensive

Baetsch/Lossau: In the economic crisis, society has probably lost its belief that progress comes of its own accord and that prosperity is self-perpetuating. But amidst the widespread laments about Germany and many missed opportunities the news broke that BMW is taking over Rover. So spectacular German successes are not a thing of the past after all.

Riesenhuber: This surprising piece of news was in fact more than a successful coup. It was a signal that can bring confidence beyond the individual case and the industry concerned. BMW is an efficient firm that has always had good financial results over the years and has put little fat on.

The signal from the Rover take over is that lean structures are important, and a lot of people are working on that. But above all it is important that we rediscover the strength for the offensive. We must break into new markets, new regions, into new and highly sophisticated technologies. We in Germany must put our structures in order, in politics, in business, and in the universities, too. And then we must take up the challenge of very ambitious high technology, the challenge of the markets in southeastern Asia, and the opportunities of global alliances.

Personal Profile

He became known to the Germans as the minister with the fly. From October 1982 to January 1993, Heinz Friedrich Ruppert Riesenhuber (58) was in charge of the Kohl government's research and technology portfolio. The laender proportional representation system caused the eloquent CDU [Christian Democratic Union] politician to be replaced more than a year ago. Matthias Wissmann, now minister of transport, then joined the cabinet—up until then the ministerial team in Bonn had not had anyone from Baden- Wuerttemberg. Today, chemistry graduate Riesenhuber advises the Federal Chancellor on questions of scientific cooperation between Europe and the United States and with Japan (the triad). The politician has a brother living in the land of the rising sun as a zen monk. Heinz Riesenhuber visits him regularly. The former federal minister, who holds an honorary doctorate from the Weizman Institute in Rehovot (Israel) began his career in the Hesse CDU after completing his studies in science and economics in 1961. From 1965 to 1969 he was land chairman of the Young Union, and from 1973 to 1978 Riesenhuber headed the Frankfurt CDU. He has been a member of the Bundestag [Lower House of the German Parliament] since 1976. Riesenhuber is married and has four children.

Italy: Science and Technology Parks Approved

BR1504121794 Turin MEDIA DUEMILA in Italian Mar 94 pp 32-35

[Article by Pierluigi Ridolfi: "The Go-Ahead (Finally) for Science and Technology Parks"]

[Text] Rome - Finally the veil over the national program for science and technology parks, which was launched two years ago, has been raised. On 8 February, [University and Research Minister Umberto Colombo disclosed the list of approved parks and announced the first funding at a meeting held at the CNEL [National Council for the Economy and Employment]. The auditorium was crowded. Really everybody who counts in Italian public research was present. However, the poor attendance from the private research sector was noted. Four hours of reports allowed the public to gather some numerical data and to listen to a wide range of opinions on the nature and goals of the parks, and the way in which they would function.

1) Science and Technology Park of Abruzzo

2) Basentech

3) Science and Technology Park of Calabria

4) The Research Citadel

5) Science and Technology Park of Elba

6) Park of Unified Lazio

7) Science and Technology Park of Molise

8) Science and Technology Park of the Naples Metropolitan Area

9) Science and Technology Park of Salerno

10) Science and Technology Park of Sardinia

11) Science and Technology Park of Sicily

12) Technomarche

13) Tecnopolis Science and Technology Park

First of all the data. Initially a good 65 proposals for parks arrived at the ministry. They were soon reduced to 31, and only 13 of these have been approved. This operation was guided by a committee of experts coordinated by Aldo Romano, lecturer in Economics and the Management of Innovation at the second University of Rome. So here, in table 1, is the long-awaited list of science and technology parks covering 105 projects (see table 2).

Table 2—Projects Proposed by the Science and Technology (received before 31/12/1993)

	Park	No. of Projects	No. of distinct and/or linked training projects
1)	PST of Abruzzo	3	1
2)	Basentech	2	1
3)	PST of Calabria	9	1
4)	The Research Citadel	8	6
5)	PST of Elba	6	
6)	Park of Unified Lazio	11	2
7	PST of Molise	4	1
8)	PST of the Naples Metropolitan Area	19	
9)	PST of Salerno	4	
10)	PST of Sardinia	9	
11)	PST of Sicily	10	3
12)	Technomarche	17	
13)	PST Tecnopolis	3	
	TOTAL		105

The total funding set aside amounts to about 1.5 trillion lire, of which 600 billion lire come from Law 46, 400 billion lire from Law 64, and 500 billion lire from the Fourth EC Framework Program. A piece of good news, or rather the excellent news, that justified the entire event and characterized its party spirit, is that 580 billion lire are available immediately.

Whoever was waiting for at least a brief description of the structure of the approved parks, and the various approved projects, remained deluded. Probably the entire subject will require a further stage of general study, even more than detailed, considering the points of view expressed by the various speakers that demonstrate how far we still have to go before the science and technology park initiative attains the efficiency that the country expects. It has become evident that the concept of a park is itself far from being given unanimous consensus. In fact many have sustained that the park, first of all, does not need to have a physical complex of spaces, buildings, and auxiliary structures, but that most of all it is a way of working together.

People were emphatically against expenditure for building and in favor of the use of existing structures and this seems to be right. However, I do not think that this impedes a united vision, also from the physical point of view, of the structure of a park. On the other hand the examples that exist in Italy (to quote a few; Tecnopolis of Bari, the Citadel of Brindisi, the Area of Trieste) also have a clear urbanistic identity. However, it has been stated that tomorrow's parks will not need to have the people physically nearby, because the information highways and the new technologies enable people to work together without moving from the place where they usually are. So the park becomes virtual, distributed, and based on the use of information systems, without a real, single, concentrated location.

Aldo Romano outlined the criteria used to evaluate the proposals. He insisted on the concept that the science and technology park must identify itself as an innovative territorial system, that is, as "a comprehensive unit made up of subjects and processes competing to organize innovative tides over the territory to assist the companies to be competitive and to develop the territorial systems." Therefore, amongst the fundamental activities of the parks there are "the identification of the needs and the evaluation of utilizable technologies and services, cost/benefit analyses of innovative projects, market evaluation, the generation of business ideas, the formulation of business plans, and the coordination and control of projects that involve both the suppliers and the users of innovative know-how, technologies and services." According to Romano the fundamental connotation of a park must be "the market trend ... with management that is hinged on the functions of marketing, finance ...."

Luigi Berlinguer, rector of Siena University, replied to Romano's vision by asking himself the fundamental question: What is a park? According to Berlinguer there is a confusion of terms here that is not only semantic. A science park is one thing and a technology park is another. The proposed supply of services accentuates the technological component, whilst in experiences abroad, principally in the United Kingdom, the scientific aspect prevails. However this does not impede the transfer of knowledge, and the relative technological spin-offs. On the contrary, this transfer is effected extremely quickly in the United Kingdom. However, science parks are needed where "ontamination" toward the technological aspects is encouraged, and this requires some physical contact between the researchers and the industrial world.

Therefore a physical place is needed where this contamination can take place in a natural way, where the nearness is real and not virtual. In this light information systems undoubtedly help communications, but they cannot substitute direct contact between people. Berlinguer also underlined that this new role, in which scientists are projected toward the outside world, needs a new type of manager able to keep one eye on science and the other on the market, managers who are able to communicate, to instigate innovations, and to manage them, managers who are not know-alls, but who know how to apply the techniques of modern management.

Other people also spoke on this subject, and their suggestions included that there should be a system of evaluation linked to results for heads of research. Sincerely this seemed bewildering to me, given that these techniques are only just starting to be applied in industry, and many share my opinion.

CNR [National Research Council] President Enrico Garaci brought up the problem of the role of the parks in relation to the universities and the existing research bodies. It is necessary to be careful not to create duplicates, also because the immense wealth of knowledge that has been generated by the targeted projects of the last 10 years has still to be evaluated. Achille Ardigo, president of the Trento cultural institute, expressed his concern that all these new structures will go into the making of empty boxes that contain nothing.

Domenico Romeo, president of the Association of Science and Technology Parks, listed the requirements that could determine the success of the various parks; willingness at a local political level to use this type of instrument to diffuse innovation, the presence of qualified research structures that are willing to collaborate with the world of industry, the ability of the companies that already exist in the catchment area of the parks to become involved, and a good organization of the basic infrastructures. Romeo also pointed out that the Italian program is the only one in the world that is part of a national policy; this could help to

make up for lost time. Certainly the future of the parks should be assisted by permanent fiscal incentives, as has been the case for some time in other countries. France is showing the way.

Minister Colombo tried to reply to everything. He started by stating that the program for the parks is not a totalizing instrument, but one of the instruments of economic policy that confirms amongst other things the recognition of the fact that research holds a central position in the national system. However, according to Colombo, it is necessary to note that innovation policy cannot just be based on scientific research. It is being realized that innovation can also result from new organizations, new logistics, and new methods of integrating human resources. Research continues to be at the center of the stage, but the scene is much wider. The parks present an opportunity to widen the horizons, to put different actors together within the same development process, and to work together. From this point of view the parks can be defined as being an alliance between various subjects to achieve common goals. Particularly during this period, business has no alternative but to look at the short term. The research that is funded by the national system must be able to look at the long term. However, if research means constructing boxes and helping the building industry there will be no funding. People can continue to work where they are, keeping in touch using information systems, as we are starting to do in this big science and technology park made up of the entire world.

Many observed, and Berlinguer was the first, that if the parks must only be an alliance, the billions for this program seem to really be a lot.

So, 13 parks have been approved, but we still do not know what the programs and schedules are. It is certain that, first of all, an inventory must be made of what is already in existence, and that there must be an analysis of the real needs of the area in which a park will be set up. A generic reference to the needs of humanity and science in general is no longer sufficient.

Therefore feet on the ground, continual monitoring of ideas and how projects are progressing, and firmly axing those initiatives that are seen to be ineffective when they are underway; just as they do in industry.

EU Commission Adopts Financial Aid Rules for Trans-European Networks

94P60222A Brussels COMMISSION PRESS RELEASE in English 2 Mar 94 pp 1-2

[Text] At the initiative of Commissioners Bangemann and Matutes, the Commission today adopted a proposal for a regulation which sets out to provide a new legal footing, on the basis of the new union treaty, for community financial aid to infrastructure projects in the sectors of transport, telecommunications and energy. This proposal lays down the general rules for granting aid, defines the different types of aid, contains selection criteria and describes the procedures for applying for financing. The regulation provides in particular for the possibility of contributing to feasibility studies, granting interest-rate subsidies and participating in loan guarantee premiums.

Establishment of this regulation has become indispensable as otherwise it would be impossible to use the appropriations entered in the budget for this purpose (ecu 251 m for 1995 increasing to ecu 640 m in 1999) following the conclusions of the European councils in Copenhagen (June 1993) and Brussels (December 1993) which stressed the importance of Trans-European infrastructure networks to economic growth in Europe.

The white paper includes a first list of strategic projects of common interest in the field of Trans-European networks. Most of the funds required will be gathered at member state level, in particular from private investors. Community financial aid will be marginal and meant more as an incentive.

Under the new title XII of the union treaty the community must contribute to the establishment and development of Trans-European networks in the areas of transport, telecommunications and energy. Establishment of these networks is essential to the smooth running of the internal market and to greater economic and social cohesion.

The lack of a legal basis in the fields of energy and telecommunications currently precludes community financial aid to networks.

Until fairly recently infrastructure networks were designed on more of a national level. This traditional approach, as far as the community is concerned, raises a number of very serious problems, such as the frequent lack of proper links between national networks, bottlenecks and obstacles to interoperability, making for enormous deficiencies. In view of these problems the community action sets out to promote interconnection and interoperability of national networks as well as access to these networks while taking account of the need to link up island, landlocked and peripheral regions to the central areas of the community. This will allow economic operators, regional and local authorities and the people of Europe in general to take full benefit of the advantages arising out of an area without internal frontiers.

In the field of transport infrastructure the regulation of 25 June 1993 on the implementation of an action programme designed to complete the integrated transport market also expires at the end of this year. This new regulation will thus provide continuity in that programme.

Germany: Transrapid Project Finally Approved

BR1304150694 Bonn DIE WELT in German 3 Mar 94 pp 1, 9

[Text] The federal government in Bonn yesterday approved the building of the Transrapid magnetic levitation rail link between Hamburg and Berlin. It approved a bill submitted by Transport Minister, Matthias Wissmann (CDU [Christian Democratic Union]), which will create the legal basis for the magnetic railway and will be introduced into the lower house of the Parliament next week. It also requires the upper house of the Parliament's approval.

Transrapid will link the two largest cities in Germany with a 284 kilometer long track by the year 2005 at the latest. The journey from Berlin to Hamburg will take only 53 minutes and cost less than 100 German marks [DM]. The terminals are Hamburg Central Station and Westkreuz, Berlin.

The Transrapid financing plan provides for a total cost of DM8.9 billion. Of this, the federal government will provide DM5.6 billion for the track and a private company DM3.3 billion for operation. Wissmann stressed that this was the first time in the Federal Republic's history that the private sector was prepared to share in the risks of a public transport project. Subsequently, the private operating company will pay the government a fee of DM138 million a year for use of the track and a further profit-related rental of DM173 million. This assumes that 14.5 million people will use Transrapid every year. The railway proper will be operated by a management company of the German Railways and Lufthansa.

Transport Minister Wissmann and Research Minister Paul Krueger (CDU) said that with Transrapid's introduction the federal government was demonstrating Germany's capabilities as an industrial nation. The magnetic levitation railway's major advantages included its high transport efficiency and particular environmental compatibility. Its construction would give German industry a technological lead over the rest of the world.

Berlin's Mayor Eberhard Diepgen (CDU) and Hamburg Mayor Henning Voscherau (SPD [German Social-Democratic Party]) welcomed the decision. Klaus Daubertshaeuser, SPD transport spokesman in the lower house of the German Parliament, called Transrapid "at best superfluous." Lower Saxony announced it would vote against the line in the upper house of the German Parliament.

Low Running Costs

Transrapid promises to become an economical transport system. The billions in investments mask its advantages in running costs. The cabinet's bill puts its running costs at DM243 million a year (at 1993 prices). Experts point to Transrapid being low on wear and tear (no friction) and much easier to maintain than the wheel on track system, where friction-related costs have a quadratic relationship to speed: If speed is doubled, costs increase fourfold. Maintenance is expected to cost half as much as with the ICE [Inter City Express]. Transrapid's automatic operation greatly reduces personnel requirements and costs. Virtually the only staff required will be for supervision and passenger care. But there are still uncertainties, such as energy costs, "because the energy supply companies are not as yet prepared to give a definite commitment on prices," the cabinet bill states.

The basic idea is the separation of private operation from publicly-owned track. Of the net investment—most recently put at DM8.9 billion—DM5.6 billion are for the track and DM3.3 billion for the private operating company. The operators's investment will come from equity capital and bank loans, and in the operational phase all the operating company's costs will be covered from current income.

The rental paid to the track company will consist of the DM140 million annual depreciation on the track and an additional payment of DM170 million. In this way about one half of the track investment will be financed by the private sector without drawing on federal government funding.

Typical Vales for a Passenger Train With:

	2 sections	6 sections	10 sections
Length	53.98 meters	163.06 meters	252.11 meters
Unladen weight	90 tonnes	270 tonnes	450 tonnes
Payload	20 tonnes	72 tonnes	124 tonnes
Total weight	110 tonnes	342 tonnes	574 tonnes
First class seats	min 80	min 304	min 528
Second class seats	max 156	max 608	max 1060
Typical use	Airport link	Urban link	Long distance link/network

Transrapid, Technology and System

Length:	Nose section 26.99 meters
	Middle section 24.77 meters
Breadth:	3.70 meters
Height:	4.06 meters
Running speed:	300 to 500 km/h
Unladen weight, passenger vehicle:	45 tonnes/section
Unladen weight, freight vehicle:	41 tonnes/section
Passenger vehicle payload:	Nose section 10 tonnes
	Middle section 13 tonnes
Number of seats, passenger vehicle:	Nose section 40-78
	Middle section 56-119
Freight vehicle payload:	Nose section 14 tonnes
	Middle section 17 tonnes

The planned terminals are Hamburg Central Station and Berlin Westkreuz. There may be a Transrapid station in Schwerin.

Problems in German Research, Competitivity Noted

94WS0267A Bonn DIE WELT in German 4 Mar 94

[Text] The German economy is mired in a crisis which is not only economic but rather is structural in nature. Incoming orders are stagnating, [German] competitiveness is decreasing alarmingly, especially in comparison to the

competition coming from Asia. Investments in future-oriented fields seem not to be materializing. Deficiencies are becoming visible especially in research.

There is no lack of analyses and proposals on how the structural weaknesses in the German economy can be overcome. However, the budgetary coffers are empty, new funds can scarcely be made available, [can] at best [be] redistributed. But here, too, there is little flexibility. What can be done within the narrow parameters in which the economic recession is currently lodged to again make the German economy more competitive?

A basic problem in the discussion about the new technologies like environmental, bio and genetic, software and microsystems technology is that until now these [areas] have mostly been viewed negatively by the public. One of the main causes for the aversion many people feel toward the new technologies is ignorance of their potential. These new technologies and their prospects must be publicized more than they have been up to now through science, policy and increased PR activity by industry. [The idea] must be gotten across that [the public] should not first see them as a potential threat but instead see the possibilities they offer for solving problems which exist world-wide.

Development of advanced technologies on the one hand and support for environmental protection on the other must no longer be viewed by the majority of the population as a contradiction in terms. Instead, their inter-effectiveness should be portrayed more often so that in the future the public will recognize in this [interaction] an improvement in their own living conditions.

Government and business must create in the schools, the universities, and in individual work places as well, a climate in which new technologies are viewed positively and research and development are supported. The number of German patent registrations, which is currently below average, can thus again increase for the mid term; and, at the same time, research can thereby again produce more marketable products.

An improvement in cooperation among science, business and industry, and policy is necessary to coordinate research, production and economic policy. The first concrete beginnings are here, such as the suggestion to establish a council on technology. Main themes of joint efforts shall be established in this technology council. The realization of individual projects from the research to the financing of prototypes can be planned in the dialogue [occurring in the council].

New technologies must be translated more quickly into marketable products. To this end it is necessary that research and industry concentrate on important plans. Uncoordinated actions will otherwise cause resources to be wasted rather than used effectively. The strengths of German research must be identified and expanded. In this way we can compensate for the weak points and reduce the gap between [us and] other countries.

This is the aim of the Federal Ministry of Research and Technology's support program "Research Cooperation" for small and mid-sized companies. The program supports cooperation concerning plans for research which an individual company cannot afford to do on its own. Sending the research personnel of companies to research institutions, or sending scientists to companies or to transnational joint operations in research and development are examples of [activities] being supported.

In addition, German ambassadors must represent our German economic interests more actively in the future. This must also include, for example, offering communications forums or facilitating contact between German and foreign companies.

Germany is, after all, the largest trading partner among the Eastern and Middle European countries, but it has long failed to exhaust the possibilities in the growth region of South East Asia, where the highest growth rates are now occurring. Asian suppliers are becoming increasingly strong competitors to European companies. German embassies in Asia may no longer be understaffed in comparison to those in the USA or in European capitals. Political and social developments should be analyzed with regard to the future and regularly be made available to the appropriate chambers [of commerce or trade] and other economically oriented organizations.

The build-up of foreign chambers of trade should also be further encouraged. The net should be knotted more tightly, particularly in the Asian sphere. Here, companies themselves must also become active and implement main themes in their associations.

Stronger cooperation by chambers and companies would be useful for exchanging information about new products and techniques of current interest, and also in opening up new markets. German organizations could work together more strongly in place and, for example, offer networked information for small and mid-sized firms or organize forums which promote exchange and unified action—for example, in the form of strategic alliances of several smaller companies.

Companies must rid themselves of false ideas: other suppliers are not solely and exclusively competitors. Opening up new markets can be easier in an association than as an individual company.

Only a combination of all these factors will make it possible to improve the future position of the economy and research and development in Germany. The point is not only to maintain the good reputation which the German economy still enjoys but to prove it anew through flexibility and new directions.

Germany: BMFT Allocates DM143 Million for Software Development

94WS0276A Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 07 Mar 94 p 10

[Text] Frankfurt—The Federal Department of Research will support the development of computer programs in Germany this year with about DM143 million. The largest part, amounting to DM26 million, will go to software

technology projects, with DM24 million going to applications software projects. In addition, technology-oriented companies in the new Federal Laender will be supported with DM20 million. The plan includes DM14 million for the software technology of the Society for Mathematics and Data Processing.

Besides this, special funding for the new Federal Laender in the amount of DM9 million and venture capital funding in connection with software development in the amount of DM8 million are being planned. Support for research loans also amounts to DM8 million. DM34 million will be made available for European Union projects.

It is also significant that software-oriented businesses make up 35 percent of the newly-founded companies in East Germany which are supported by the Program for New Technology-Oriented Companies. In the funding of venture capital in West Germany through the program "Venture Capital Participation (BJTOU)" the proportion is somewhat lower.

The Society for Mathematics and Data Processing also performs an important task, focussing particularly on software development and technology. It is also included in future software support.

At the moment three objectives dominate in software technology. One is the development of technologies to model organizational and technical systems and processes and to define applications architectures specific to certain industries or products, including the related component libraries.

Another objective is the further development and testing of methods and tools for the maintenance and reusing of applications systems on the basis of corresponding applications architectures. And a third is working on the further development of software technology for improving the security and reliability of complex information technology systems.

Daimler-Benz's Weule on Need for Research Policy Coordination

94WS0260A Duesseldorf HANDELSBLATT in German 8 Mar 94 p 23

[Text] In the view of Prof. Dr. Hartmut Weule, who is on the Daimler-Benz AG board of directors and responsible for its department of research and technology, proud traditions are indeed well and good. But they are not enough when it comes to safeguarding the future position of German industry. Weule is therefore calling for a new research policy.

At the 100th anniversary celebration of the study of production technology at the Technical University in Darmstadt, Weule said that the amount Germany spends for research is comparable to that spent by the United States or Japan. The USA spends 154 billion dollars on research annually, Japan 72 billion and Germany 35.5 billion. That corresponds to 2.8% (USA), 3.05% (Japan) and 2.7% (Germany) of the GNP of these countries respectively.

In Germany, the lion's share of 60% of this expenditure is financed by industry. Still, in spite of the relatively high expenditure for research and development—by the state as well as by business and industry—the innovative end results which were expected have largely failed to materialize.

Weule attributes this to several causes. Management of research and development in Germany is not organized optimally. There is too little agreement between the publicly financed research sectors and those of industry regarding the goals of research. Around 22 billion German marks are available for basic research at universities and research institutions, with only about three billion German marks of this total going to applications oriented research. In contrast, industry must bear the brunt of the cost of research needed for technological advancement of its products; but it can only summon about five billion German marks annually for this [purpose].

Industry and State Impede the Transfer of Technology.

Add to this that the transfer of technology between publicly financed research and industry research does not work. Both sides bear responsibility for this in Weule's opinion. On the public side he notes an "insufficiently developed interest on the part of scientists in the needs of the market." In industry, on the other hand, he sees an "arrogance toward results from outside research," a phenomenon which has long been known in the Anglo Saxon sphere as the NIH syndrome ("not invented here").

In contrast to this approach, the research policies of the competition, first and foremost the United States and Japan, are much more in accord with industry. In the USA the universities have to rely directly on the acceptance of commissioned research if they want to survive financially. In Japan, on the other hand, industry itself via very large tax breaks is able to spend substantial amounts of money for research which is applications oriented and product related.

The Principle of the Watering Can Instead of Optimization of Scarce Resources.

Weule also criticized the lack of focus in German research. The financial resources which are available are often distributed on the "watering can principle." In addition to the Federal Ministry of Research and Technology, there are also 15 other federal authorities which distribute research funds. So nearly every German state maintains its own microelectronics center, now being joined by microsystems technology institutes.

Mid-sized and small companies also lack any focus in supporting research. Finally, the large German research facilities, too, are working without tightly defined purposes.

According to Weule, all these deficiencies have caused the high-tech product share of German exports to drop to a modest 16%.

The research head of Daimler-Benz therefore welcomed the formation of a so-called "group of five" in November of last year. Industry, universities, the Fraunhofer Society, the Federal Ministry of Research and Technology as well

as IG Metall work together in this group to obtain tangible results in German research policy. Still this month this Group of Five shall present guidelines for a better and more effective means of promoting research in Germany.

Germany: Initiative to Encourage Research in Eastern Germany Launched

94P60167A Frankfurt/Main FRANKFURTER ALLGEMEINE in German 8 Mar 94 p 13

[Text] BDI (Federal Association of German Industry) intends to use an "Eastern Research Initiative" to highlight the accomplishments of innovative companies in the new laender. The purpose of the initiative is to provide the remaining research units in eastern Germany with additional contracts. Therefore the BDI intends to include industrial research in the "Purchasing Offensive" in the New Laender', which it created together with the Treuhandanstalt. In the context of this action, 90 industrial or trading companies pledge to increase considerably their purchases from eastern Germany. The BDI intends to present its research initiative on 9 March at the innovation forum of the Leipzig Spring Fair.

The BDI calls upon west German industry to spend a significant part of their contract research funds in the new laender. The BDI points to the array of services available from more than 180 enterprises with 4000 employees. The Technology Mediation Agency has composed a catalog of these services.

The BDI hopes to make a contribution toward preventing a further diminishing of the industrial research capacity in eastern Germany. Whereas a total of 86,000 persons were employed in such establishments in 1989, the figure for today is only about 11,500. The BDI is aware that numerous state institutes are also competing for a share of the annual contract research market, which comes to less than a billion marks. However, it is stressed that eastern German companies, because of public support, can offer research at attractive prices. The federal promotion program "West-East Contract Research," which pays eastern German research institutes 35 to 40 percent of the contract amount as a subsidy, has been extended until the end of 1994.

The BDI hopes that the existing research institutes will become seeds for a new industrial structure in the new laender. It points to numerous successful examples in western Germany of technology transfer from research laboratories to companies in the area. Many companies have reduced their research activities for reasons of cost, but these companies are still dependent on new developments. Industrial research must take advantage of this opportunity, according to the BDI.

European-U.S. Conflict in GPS System Development

94WS0276B Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 09 Mar 94 p 8

[Text] London—In spite of the fact that satellite navigation has long reached technological maturity and has been thoroughly integrated into flying practice, serious disagreements in this area are emerging between Europe and America. Essentially the problem is that legally access to the American Global Positioning System (GPS satellite system) is not guaranteed for non-American airlines. The American authorities are pressing for exclusive use of the GPS system for navigation in American airspace. But the Europeans are not prepared to agree to such exclusiveness.

Since the European governments and industry are hardly in a position to offer their own equivalent satellite system for aerial navigation in the foreseeable future because of cost considerations, other alternatives have been sought in Europe for some time. This has led in the recent past to a series of conversations with Russia.

These conversations explored the possibility of utilizing the extraordinarily precisely functioning Russian GLONASS system. However, the disadvantage of such a solution would lie in the fact that it would involve heavy dependence on the Russian military, which exerts a significant and probably even decisive influence on the GLONASS system. It is thus doubtful whether the Russian card can be played credibly in negotiations with the United States.

Within Europe aerial navigation still relies mostly on ground facilities. Even the efforts to unify the European navigation systems will be based on ground facilities for the foreseeable future. Considerations of cost effectiveness are not infrequently cited as justification for following this line.

However, in Great Britain, for example, the Civil Aviation Authority (CAA), as the competent authority, hopes to reach a compromise with the Americans. This would mean that while in general satellite navigation would be preferred, the so-called third generation of INMARSAT satellites to be launched in 1995 and 1996 would have to be permitted. That would have the additional advantage that the precision of the GPS system would be improved beyond what has been achieved so far. The prospects are that there will be a new board under the auspices of the European Community in the foreseeable future which will deal with the long-term possibilities for aerial navigation and to which the European Space Agency and the flight insurance organization Eurocontrol will belong, along with EC agencies.

In this connection, Brussels is weighing a plan to create a satellite navigation system in the long term under the auspices of the International Civil Aviation Organization (ICAO), a system which would not be subject either to individual states or to their militaries.

Germany: SPD's Proposals for Science, Research Noted

94WS0288A Frankfurt/Main FRANKFURTER ALLGEMEINE in German 16 Mar 94 p 4

[Text] S.Sch. Berlin—Science and research would be given more emphasis than before in a Federal government led by the SPD. To the extent that the SPD takes over the responsibility of government, it plans to increase the research budget by about a billion marks a year. In order to

enhance the importance of research and education in the cabinet, their "jurisdictions are to be combined." This could come about in the form of a joint department to which certain cultural assignments could also be transferred for which the Federal Department of the Interior is responsible at present. This is what Bundestag member Glotz said in Berlin; he is responsible for the topics of education, research and culuture in the "Rudolf Scharping Governmental Commission" and is to shape the SPD's governmental program on these points.

To improve the dialog between the state, science and society the SPD hopes to set up a "Technology Council" on the American model by law. The members, to be appointed by the Federal president, are to obtain expert opinions on questions of technological development and application. The Technology Council is to fulfil an advisory function like that of the Science Council, which has existed for more than 30 years.

The SPD wants to increase spending for the expansion of colleges from the present DM1.6 billion to DM2 billion a year. Preference is to be given to the founding and expansion of technical colleges. Glotz said that the efficiency of the colleges must be maintained. He also said that the program laid down in the Federal Aid to Education Law (BAFOeG) should be opened up to more young people. The SPD rejects study fees for college education; but it advocates the introduction of a standard duration of studies. More self-determination should be possible for the individual universities through the establishment of global budgets. But they would have to undergo an evaluative process at regular intervals. According to the SPD, criteria for tracking performance and efficiency will have to be worked out for this purpose. Basic research at the universities and in non-university research centers is a decisive factor for Germany's international position; therefore, Glotz said, there would be no reduction in basic research under the SPD.

The SPD's science policy spokesmen from the new Laender demanded in Berlin that priority be given to universities and non-university research in the new Laender. Glotz said that the imbalance between West and East with regard to the number of major research institutes, a number which is financially favorable to the Laender but expensive for the Union, would not be reduced by new major research institutes in the East. But a certain amount of equalization in favor of the new Laender could be envisioned in project financing.

France: Paceo 2 Military Components Research Program Detailed

BR0504151694 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 17 Mar 94 p11

[Article signed Serge Brosselin: "Military Components Research Tightens its Belt"]

[Text] The Paceo 2 program was decreed by the defense minister in September 1992. Aimed at ensuring the autonomy of the French arms industry where strategic components are concerned, it is currently undergoing a financial review. However, one of the officials in charge of monitoring the plan stated, on 15 January, that the issues currently being discussed by the experts do not include a revision of the major lines of research, nor do they question the distribution of credits allocated to each type of component, but instead focus on a possible revision of the overall budget for Paceo 2. The Defense Ministry explains that this study into the financial repositioning of Paceo 2 is based on a change in how strategic components are defined in the new military context.

This plan, covering the period 1992-1997, aims to build on the progress made in R&D by Paceo 1 (which was planned for and quantified financially), to use civil developments to ensure that only essential additional developments are made for military applications, and to promote cooperation, especially at the European level, which was previously envisaged but which was not quite as pressing an issue then as it is today.

Priority for Optronics

Paceo 2 will probably be altered in 1994 to run along the lines of the last two objectives—converting civil applications for military use, and encouraging European cooperation (based on the distribution of technological poles of excellence, as stated in the Plan Committee's report). Henri Lemoine, director of the Paceo program, said: "Paceo 2 does not provide for the development of standard-function circuits, with the exception of analog-to-digital converters which are considered vital for the process upstream of signal processing." He went on to stress that the efforts made in Paceo 1 in gallium arsenide-based hyperfrequency technology would be stepped up in Paceo 2, notably toward high frequencies.

A number of developments could be increased in Paceo 2, in particular in the field of optronics. One of the officials in charge of electronics at the General Armaments Delegation [DGA] said: "We will be concentrating in particular on frequency-adjustable lasers, and especially free electron lasers and parametric optical oscillators. The rapid development of optronic display and target acquisition systems means that we have to design extremely precise systems capable of penetrating the enemy lens and of 'inverting' it so that when the beam passes through it, it can focus on and destroy the most delicate components."

Other types of components for which there should be no cause for concern are frequency-time components (it is vital to fully synchronize the clocks of increasingly interoperational systems) and components used in interconnection functions—new to Paceo 2 and not considered in Paceo 1. In addition, more priority will be given to the development of components and modules for the design of more exotic weapons (such as microwave systems, radio frequency weapons, and electric cannon for land forces).

Germany: Bonn Region to Become Science, Technology Center

94WS0288B Duesseldorf HANDELSBLATT in German 22 Mar 94 p 6

[Article: "Competition for the Future of the Old Capital"]

[Text] Duesseldorf—The transfer of the government and the parliament to Berlin makes it possible: the former Federal capital is to become a scientific capital. By June the Union, the Laender involved, the city and the administrative districts hope to have signed a compensation agreement. Participating project sponsors warn that this unique opportunity for Germany's industrial standing should not be wasted.

Speed is of the essence if the stated timetable is to be adhered to. At the moment, however, according to the Federal Education Ministry there is not even clarity about the question of how much money really will be available for developing the science region.

According to the minutes of a session of leaders of parties and parliamentary groups in the office of the Federal chancellor, the Union is making a total of DM2.8 billion available for compensation payments for the transfer of the parliament and the government. This sum is apportioned for the development of the science region and of the cultural region of Bonn and for regional economic support. Even if it is not easy to draw the boundaries of the individual projects, the experts assume that something like DM1.6 billion will be available for founding the planned scientific institutes.

The establishment of an approximate financial framework makes one thing definite: there will scarcely be enough money for all the projects according to the planning done so far. This opens the door for competition between the better ideas.

It will be principally the region itself which will set the standards for making a decision, i.e. the city of Bonn and the administrative districts involved, Bad Neuenahr/Ahrweiler and Rhein-Sieg. But the Union and the Laender of North Rhine-Westphalia and Rhineland-Palatinate must sign the compensation agreement. With so many decision-makers it is not surprising if the presidents of the universities of Bonn, Aachen and Cologne warn of the dangers of fragmenting the financial means among too many individual projects.

For the president of the University of Bonn, Prof. Max Huber, what is at stake is more than compensation for the Bonn region for the transfer of government. "A high achievement center for science and research would have had to be instituted even without the transfer for the sake of Germany's industrial standing," he says with conviction.

He wants to do justice to the "enormous challenge," to this "unique opportunity" in cooperation with the universities of Aachen and Cologne through the CAESAR-Plus project. CAESAR stands for "Center of Advanced European Studies and Research," and is intended to become a center for applied natural sciences and high technology research.

It is to be concerned primarily with the development and the application of modern key technologies at the interfaces between physics, chemistry and biology. Partial institutes are to be founded on a temporary basis in which international teams of researchers will carry out an immediate technology transfer from basic research to technical-industrial application.

The CAESAR project is intended to become an independent institute outside the university, while cooperating in the training of graduate students at the universities. For Huber this is overall an applicable basic pattern for the Center for European Integration Research (ZEI), which is also being planned, and for the North-South Center for Developmental Research (ZEF). The three projects taken together, and logically called CAESAR-Plus, will be assessed during a planning period from 1994 to 2004 at a cost of DM952 million.

The other major project is the new construction of a Rhein-Sieg training college, which will cost DM714 million according to official statements by the North Rhine-Westphalian secretary for science and research, Anke Brunn. It remains to be seen how far the planners of the training college will be able to carry out their substantive ideas. It is to be innovative, and for Professor Reinhard Zulauf of the support circle for the Rhein-Sieg training college that means above all "an amazingly far-reaching autonomy" for the training college.

Zulauf has the idea of a privately organized training college whose sponsor is the state. As sources of endowment, the Land and the Union would sit on the board of directors; business and the region could influence the concerns of the training college through an advisory board.

During semester breaks further education organizations, financed by business, are to be be housed in the classrooms of the Rhein-Sieg training college; these could bring additional advantages to the region. The lecturers and professors are not to be given civil service ranking, but are to be paid by what they accomplish.

It is clear to the instigators that this is am ambitious project. They say that business is showing "strong interest," but at the departments of the Laender which are responsible they say that they have met with reservations. This is not surprising to Zulauf, since "global budgets and college autonomy mean a loss of power for public administrations." The first stage seems to have been accomplished now; the department has agreed to the project in principle. Now its concrete enactment will be a matter for negotiation.

These two major projects for the Bonn area have already gone beyond the financial framework of DM1.6 billion. And there is still the expansion of the Rhineland-Palatinate training college at Ahrweiler, the Bonn European School of Economics (BEC), which will cost DM20-25 billion annually aside from investment costs, according to Federal Education Secretary Karl-Hans Laermann, the transfer of the Federal Institute for Professional Training (BIBB) from Berlin to Bonn, the Foundation for Support of the Gifted and the founding of a Land institute for further education in Rhineland-Palatinate.

Negotiations are likewise still going on about the founding of new institutes of the Fraunhofer Society and Max

Planck Society, while discussion continues on the establishment of an institute for synchrotron radiation (LISA) and the founding of an academy for the evaluation of the consequences of technology.

Not all these projects have to be financed completely from the compensation fund of DM1.6 billion, but in view of this wide range of offerings it will still not be possible to pay for everything. It is thus thinkable that some projects will be postponed, although this would contradiction the intention of creating compensation for the Bonn region which is effective in the job market by the transfer deadline of the year 2000.

"The financial cover is thin," Secretary Brunn stressed in presenting the idea of the Rhein-Sieg training college, which she eagerly praised as the Land's 53rd college. Whether the Land will participate in the costs of the training college could become a point of contention.

So far the plan is that the Union should assume all the investment costs and running costs for 10 years. But since the training college is a task which the Land would have had to set itself in the face of overfilled colleges and known prognoses for the requirements of the job market even without the move to Berlin, some participation by the Land in investments and running costs would be thinkable from the beginning—at least if the opportunity to create a Bonn science region is to be taken really seriously.

German Research Minister on Ocean Research, Sea Technology Goals

94WS0283A Duesseldorf HANDELSBLATT in German 23 Mar 94 p 25

[Article by Paul Krueger: "Priority Goes to Climatic Studies and Environmental Research"]

[Text] Ocean research and sea technology are a priority sector of the Federal Research and Technology Ministry's [BMFT] environmental research and technology. Environmental problems are still continuing to increase despite international commitments in the environmental research sector. That is why a common challenge confronts both policy and research: the elaboration of effective strategies for precautionary measures and limitation of risk.

The federal government intends to use the 1993-1997 ocean research program to fit the diverse activities in Germany into a conceptual framework. One important goal in this context is more intensive inclusion of facilities sponsored jointly by the federation and the laender that cover a substantial portion of long-term, targeted research. On the other hand, support for projects with a fixed deadline should boost significant research sectors of ocean research having relevance for climate and the environment. They should also lay the basis for new, significant research themes (e.g., deep-sea research).

Detailed Recitals Dispensed With

The ocean research program dispenses with a detailed recital of individual research themes. This affords greater flexibility, facilitating adjustments to current developments. By 1997, the federation will supply nearly DM1.1 billion for the support of projects and for institutional support (federal facilities, major research institutions and "blue-list" institutes). Nearly DM680 million of that will be made available from the BMFT's budget.

Close to 900 scientists in the FRG are presently active in the ocean research and sea technology sector. German reunification resulted in additional top-notch know-how. The capabilities also include a modern fleet of research vessels.

The new ocean research program is focused on the role of the ocean in climatic events both as a polluted eco-system and as a source of raw materials. Simultaneously, the BMFT will support the development of methods and processes for ocean monitoring and research related to climate and the environment supposed to result in the elaboration of specific alternative solutions. Conceivable in this context, for instance, are targeted studies of the conversion of water, matter and energy in Germany's bay or the mud-flats and studies on clarification of the mechanisms for stability and buffering on the sea floors and harbors of the Baltic in order to facilitate a joint assessment of the eco-system.

The multitude and complexity of the issues demand international coordination of the research. Global problems can be solved meaningfully only through international cooperation with partners. Ocean sciences deserve more intensively concentrated traditional, international cooperation so as to be able to avoid uncoordinated individual research efforts and duplications.

European Cooperation to Improve Research

The cooperation of German scientists and engineers in the formulation and implementation of international programs is an important concern. Such programs include international ocean research and monitoring activities such as the World Ocean Circulation Experiment [WOCE], the International Geosphere-Biosphere Program [IGBP], the Ocean Drilling Program [ODP] and the planned Global Ocean Observing System [GOOS], an international system for monitoring the ocean environment.

In addition to cooperation with the states of the European Community [EC] there has recently been increased cooperation with the countries of the former East Bloc. Last year, the EU's program for Maritime Sciences and Technology [MAST] significantly improved cooperation in ocean research that has an extensively basic orientation for the time being.

In the EU's ministerial council the federal government championed the furnishing of appropriate financial means for the fourth framework program for research and technological development (1994-1998). On the basis of the joint position of the EU's ministerial council for research, nearly DM24 billion (plus a DM2 billion reserve)are projected. An agreement on suggested changes by the European Parliament is pending.

A particular success was the provision of nearly DM2.25 billion in support funding for the environmental research portion. DM1.75 billion of that is allocated for environmental and climatic research and DM460 million for

ocean research and sea technology. Compared to the DM220 million in the third framework program, the doubling of funding in the ocean research and technology sector represents an appropriate amount.

With a view towards European ocean research oriented towards problems there needs to be a tightening up and concentration of activities beyond pure basic research. The BMFT has already submitted appropriate proposals to the Commission and these have been supported by other member states also. One of the foci is the impact of the greenhouse effect and possible changes in the ocean level of European seas. Also of importance are studies of the increased pollution of all European seas. The BMFT is proposing a special Baltic Sea research program for this purpose that should be jointly formulated by all bordering jurisdictions.

Based on the intense debate being conducted again in some states regarding dumping of waste materials on the ocean floor, research into the still extensively uncharted hydrographic and chemical/biological conditions in the deep sea are particularly urgent. As a result, the negative consequences of such activities should be pointed out on timely basis.

German research activities are focused with a number of research projects on the assessment of the engineering impact of any future deep sea mining. To this effect, since 1989 the BMFT has made DM17 million available for a time period of approximately five years. There is current discussion of a Europeanization of such studies.

Technically and financially promising developments of new processes and equipment for ocean research, monitoring and remote sensing processes have to be developed through close European cooperation. This applies especially to the technical and infrastructure developments of planned large European projects that go beyond basic developments. Only through European cooperation is it possible to develop recommended large projects on the part of the European Committee on Ocean and Polar Sciences [ECOPS], a working group set up by the EU Commission and the European Science Foundation [ESF]. These include projects in polar research, deep sea research and the development of ocean models, for example, for climate forecasts the spread of pollution, the development and implementation of operational systems for ocean monitoring as well as European inland lakes, rivers and canals as a European contribution to GOOS. The ECOPS initiative is significant. On a national level, the BMFT will undertake appropriate additional activities.

Indispensable for the efficient implementation of R&D in the sector of ocean research are innovative "twenty-first century technologies" even from the vantage point of the economy of ocean research and ocean monitoring (e.g., cost reduction through friendly servicing, long-term stability). The internationally agreed GOOS is critically dependent on new developments as the deep sea research projects to be designed on the European level. There is considerable demand for the development of measurement devices in terms of their long-term stability (encrustation, corrosion) and their energy supply.

Autonomous Robots for Sea Floor Operations

Additionally, equipment and sensors have to be developed that will allow sure sampling of inorganic and organic trace substances and easily escapable components and facilitate precise, standardized measurement processes for the transport of substances in the water column or on the sea floor. Successful deep sea research is impossible without autonomously functioning robot systems for the tasks of measuring, sampling and experimentation. There will also be a continued increase in the demand for methods for remote sensing and for automated sampling and data acquisition. For this reason the BMFT will steadily support the transfer of technology from other high-technology sectors (e.g., biotechnology, materials research, microsystems engineering) to ocean research. A report to that effect is in preparation.

In terms of European endeavors to develop a common market and in view of intense international competition in ocean research and ocean monitoring technology, it therefore appears worthwhile to combine the R&D capabilities existing in Europe in order to develop a joint, competitive industry based on a division of labor. The Eureka project, Euromar, initiated in the mid-eighties by Germany has shown that joint development of modern techniques for ocean research is feasible. Research facilities and companies from 12 European states are successfully cooperating in that project.

Competition from the U.S. and Japan can be countered only with especially innovative approaches. In terms of "leadership in the technology market" by German firms, market niches and competitive positions have to identified and occupied in an international context. In this association, it should be the joint and imperative responsibility of government and private sector R&D to promote on a priority basis recent technologies having highly innovative and even economic potential and convert them into marketable products. In this way it will be possible for ocean research and ocean monitoring technology to contribute to safeguarding the competitiveness of Germany's economic position.

The same also applies to the sea technology programs. The diverse activities of government and industrial organizations to develop the maritime industry, that occurred during the years 1991-1993, the restructuring of the maritime industry in the new laender of the FRG, the development of Europe's internal market and not least, the growing volume of traffic in Europe's economic zone, including bordering states, made it imperative to undertake an adaptation and reorientation of the sea technology research concept.

The fundamental goal of the concept is to continue to develop the efficiency of the maritime industry in an international market that is growing more difficult and to clearly enhance competitiveness. Therefore the industry should be enabled to strengthen its international position in the volume of merchandise, efficiency, safety and environmental protection in the transport and thereby generally to improve the status of the traffic. To this effect, close cooperation in Europe is inevitable.

From a technological viewpoint, Germany's shipbuilding industry ranks among the world's leaders. Even development activities supported thus far by the BMFT, such as the "ship of the future," have resulted in important and some currently trailblazing developments for the international market. However, the total available potential for innovation has not yet been tapped. Besides further necessary improvements in terms of the ship "product," considerable efforts have to be made to optimize its production process.

What is more, the ship has to be in a position to discern its responsibilities meaningfully in the European transportation authority. The ship has the potential to significantly relieve Europe's traffic system and not least to counter the collapse of transit traffic in Germany to the advantage of all partners. The ship traffic solutions to be elaborated for this purpose in the total traffic transportation chain call for new sorts of technological considerations for which the groundwork has to be fashioned.

France: National Debate on R&D Continued

Colloquium on International Aspects

94WS0291A Paris AFP SCIENCES in French 24 Mar 94 pp 1-2

[Article: "France: Penultimate Phase of National Research Consultation"]

[Text] Lille—On 18 March Mr. Francois Fillon, the minister for higher education and research, brought to a close the series of six regional colloquia held as part of the National Consultation on Research in France, the final phase of which will unfold in Paris on 18 April.

On that date, at the La Villette Science and Industry Complex, a national-level colloquium will be held to produce a synthesis of findings to serve as basis for the final report on the broad objectives of French research programs. The government plans to have the latter's main conclusions debated in parliament in the spring session.

At Lille, Mr. Fillon reaffirmed the government's continued commitment to the "international dimension" of French research programs and to ensuring that this dimension encompasses not only the "obligatory cooperation" with the United States and Japan but also the Third World and former Soviet bloc. He noted that "France deliberately opted for international cooperation in research, for reasons of policy... The sharing of knowledge and ideas is an obligation that we do not intend to renounce."

The Lille colloquium, which focused on international aspects of research, afforded an opportunity to show the importance—but also the constraints and perils—of bilateral, European, and global cooperation. Bilateral cooperation poses the fewest problems, once a decision is made, and according to many participants it is much faster than building or operating large international facilities (observatories, synchrotrons, research reactors, etc.).

Difficulties are even greater when projects must wind their way through the bureaucracies of Brussels and the European Union [EU]. Some fear that with procedures for a partnership of the Twelve already so cumbersome, they may become even more ponderous with the move to 16 members. Mr. Fillon noted that the fourth framework-program for European R&D has been funded at the level of 13 billion ECU (90 billion French francs [Fr]) for the 1994-1998 period. The decision, resulting from compromises at the ministerial level, was made in December but has not yet been approved by the European Parliament.

No one denies the obvious. "The internationalization of science is a fact and is accelerating at an unprecedented rate, forcing our country to confront a series of problems of great importance for the future," the minister added. "French research must constantly measure itself against the yardstick of global scientific and technical competitiveness." It cannot hide behind an "absolute but illusory independence;" rather it should maintain "a degree of autonomy compatible with increased cooperation."

All the same, it is not easy to find ways to place more French researchers in positions abroad or accommodate more foreign research personnel in France itself. For example, out of 2,500 foreign researchers at CNRS [National Scientific Research Center], the center can pay the salaries of only 200, lamented Mr. Francois Kourilsky, its director general. "We are still waiting," he said, "for the circular promised by the prime minister to soften the adverse impact of the Pasqua Law on family reunification for foreign researchers."

It was generally agreed that only if France has a strong research program can it hope to be the site of major installations or carry weight in international [scientific] decisions. Many speakers, including the minister, urged the establishment of a group of renowned "research diplomats."

Japanese Survey Model Copied

94WS0291B Paris AFP SCIENCES in French 17 Mar 94 p 1

[Article: "Delphi: A 'Japanese' Survey of Technological Prospects"]

[Text] Paris—Some 4,500 French researchers in industry, academia, and the public sector received a long questionnaire from SOFRES [French Opinion Polling Company] last February covering 1,000 technical advances that might come in the next 30 years and asking for their opinions on those falling in their areas of expertise.

The questionnaire for France's Project Delphi is modeled—and this has given rise to controversy—on one that Japan has been sending out every 4 or 5 years to 2,700 of its researchers to help prepare a forecasting study that is factored into decisions on future developments, technical and otherwise.

Last December Mr. Francois Fillon, minister for higher education and research, announced his intention to conduct such a survey without waiting for a French questionnaire to be elaborated. His objective, one that was shared by his predecessor, Mr. Hubert Curien, was to assess technological developments in France using a procedure

that is coming into increasing use elsewhere; Germany, for example, utilized the Japanese survey technique last year.

Some 40 percent of those surveyed work in industry and another 30 percent in academia, while the remaining 30 percent are in public-sector research. Mr. Fillon attached to the questionnaire a letter from Mr. Bernard Decomps, head of the general directorate for research and technology, who emphasized, apart from the Japanese context, that the questions should be treated "as a tool to move forward on the difficult task of identifying areas of technical advance that seem likely to constitute the foundation of future developments, be they 'technological' in nature or 'related to changes in lifestyles.'"

The exercise, which also "takes more near-term considerations into account," is being carried out in collaboration with the Ministry of Defense "under the auspices of the Ministry of Industry," according to Mr. Decomps. "Responses should bear on the situation in France, what developments are under way, whether the technologies involved must be imported or France is participating in international programs to develop them."

The questionnaire covers 15 general domains from materials processing technology to medicine, space, transport, life sciences, marine science, earth sciences, agriculture, city planning, etc. The minister observed that the project is indirectly tied to the national consultation on broad research objectives, which is supposed to culminate, in June, in a parliamentary debate and perhaps elaboration of a programming law.

Analysis of responses to the questionnaire is not expected to be complete before autumn, because a second phase must be carried out in mid-1994, giving respondents an opportunity to review statistical summaries of their colleagues' and peers' responses and modify their own views or dispute those of others.

Role of Small, Medium-Sized Companies

94WS0291C Paris AFP SCIENCES in French 17 Mar 94 p 2

[Article: "Fillon to Industry: Technology and Innovation are Your Best Strategic Assets"]

[Text] Le Mans—For PMEs and PMIs [small and medium-sized enterprises and industries], well-integrated technology and innovation are "strategic assets as important as financial and human resources," said Mr. Francois Fillon, minister for higher education and research, on 11 March at Le Mans while opening the fifth of six colloquia in the National Consultation on the Broad Objectives of Research in France.

Speaking on his home turf in Sarthe at Epau abbey, the minister urged heads of enterprises to augment their commitment to research and innovation and introduce new products that meet needs in the marketplace while "taking into account society's new aspirations."

Although the volume of industrial research outlays has greatly increased in the last 10 years, France "is still where it was in 1981, in relation to competitors." Such research is equivalent to only 1.5 percent of GDP, "which places our country far behind Japan (2.1 percent), the United States (1.9 percent), and Germany (1.8 percent). If we look at the percentage of turnover that comes from innovative products that have been on the market for less than 5 years, we see that 10 percent of enterprises with 20-100 workers (33 percent of enterprises employing more than 2,000 people) are generating more than 30 percent of their turnover" from such products.

"In PMEs with 20-2,000 employees, product innovation is seen much more frequently than process innovation." Eighty percent of industrial concerns believe "the impact of the market on innovation is strong or very strong, but technological change is seen by only 60 percent of them as the engine of innovation," the minister noted.

Recalling various vehicles for state assistance to spur innovation, especially ANVAR [National Agency for Promotion of Research] and tax credits for research outlays (Fr4 billion per year), Mr. Fillon asked his interlocutors—researchers and heads of enterprises—if the thicket of bureaucracy and regulations that applicants must negotiate to obtain such aid was too dense and needed to be simplified to make access easier.

Emphasizing that mechanisms of risk-capital and development-capital financing were poorly developed in France, the minister urged colloquium participants to tell him how the country's financial system could be changed to foster more innovation, if a decision should be made to do so.

EU-12 Countries, EU Parliament Conclude R&D Agreement

94WS0292C Paris AFP SCIENCES in French 24 Mar 94 p 2

[Article: "Research: Accord Between EU-12, European Parliament"]

[Text] Brussels—In Brussels on 21 March, the EU [European Union]-12 and the European Parliament reached agreement on a budget of 12.3 billion ECU's (80 billion French francs) for technological research and development projects during the period from 1994 to 1996.

The agreement provides for an additional appropriation of 700 million ECU's at the time of its revision on 30 June 1996, thus bringing the total to 13 billion ECU's. Agreement was reached through the conciliation procedure provided by the Maastricht treaty for cases of disagreement between the two institutions. The conciliation committee consists of representatives of the EU-12 and members of the European Parliament. The agreement must still be approved by the European Parliament at its next plenary session. The Parliament had initially asked for a total budget of 13.4 billion ECU's, but the council refused to go higher than 13 billion.

The agreement increases by 300 million ECU's the appropriation provided by the EU-12 Council of Ministers for the 1994-1996 period. Fifty percent of that additional appropriation will be used for technological research and development programs, 40 percent will go to international

cooperation activities, and 10 percent will be used to disseminate the results among small and medium-size businesses.

The EU-12 and the European Parliament also agreed to provide a budget of 900 million ECU's for the Common Research Center, 22 percent of whose activities will be open to the laboratories of the member states through competitive bidding.

Germany: Dialog Urged between Government, Industry on Research

94WS0288B Frankfurt/Main FRANKFURTER ALLGEMEINE in German 30 Mar 94 p 5

[Text] Halle, 29 Mar—Before the reunification of Germany there was much criticism of the research institutes in West Germany. It was silenced when unification came, since uniform structures for research in West and East were to be produced in the shortest possible time. New research institutes were founded in the East on the model of western institutions. That reforms in the new Laender might have any effects on the situation in the old Laender has so far—apart from a few exceptions—proved illusory.

In looking back over the new organization of science in East Germany it also becomes clear that too little money has been made availabe for research there since 1990. But now the prevalent opinion is that "Germany's international position" depends in large measure on the findings of basic research being utilized as quickly as possible to develop internationally competitive products. A consequence of this was the the budget of the Federal Department of Resarch and Technology (BMFT) was not further cut, so that the Federal Research Secretary has more than DM10 billion at his disposal this year.

It has also proved to be a disadvantage that industrial research in the East employs only 15,000 workers instead of the previous 75,000. In part this is the fault of the trustee organization, which paid too little attention to the continued existence of the research departments in selling the businesses. It is true that industrial research also dropped by 10 to 20 percent between 1989 and 1992 in West Germany, a fact which has now been shown to be a competitive disadvantage. Now the political parties are calling for "concentrated action" (SPD) or "initiatives for strengthening technical innovation" (CDU). The BMFT supports industrial research with DM800 million annually, although this really falls under the jurisdiction of the Department of the Economy. At the same time the BMFT is trying hard to get a dialog going between business and the basic research which is being conducted in the institutes of the Max Planck Society, in the institutes of the socalled Blue List and in the major research institutes of the Union.

Gebhard Ziller, secretary of state in the BMFT, says that there is no royal road to achieving this; numerous routes are being pursued. Thus he says that at the instigation of the BMFT major industries and major research have bee successfully brought together. He says that recently managers from Daimler and Siemens found out in major research institutes about the possibilities of cooperation. In the eyes of society such contacts are still suspect, he says. Thus Professor Winnacker, a respected biochemist, was recently taken to task in a TV program for "cooperating with industry."

The department sees itself, in Ziller's words, as a moderator of contacts and cooperation. He says that for example it increasingly encourages combined research and launches programs which require cooperation. In addition to support programs which were aimed at investigating new technologies, credit programs were increasingly made available which guaranteed the final step to market readiness for new ideas. The BMFT can also improve cooperation in its area of influence, particularly in non-university research institutes, by administrative methods. Thus for example the "Society for Heavy Ion Research" was encouraged to serve practical medicine when the heavy ions were used to destroy cancerous growths.

The dialog between business, politics and science in Germany has also been set moving through the establishment of rounds of talks. The "Strategic Circle for Research and Technology" under the Federal research secretary and the "Council for Research, Technology and Innovation" under the Federal chancellor are not "decision-making bodies," Ziller says, but they create a "strong pressure to reach an understanding on something which is then actually put into practice." He says that it soon became clear in the conversations with the chancellor that money was only a part of research support, but that the general conditions were at least equally important. This included the length of time required for licensing procedures and legislation on gene technology, chemicals, animal protection, environment or data protection, which might turn out to be a help or a hindrance. In addition, tax relief for research projects, which is common in other European countries, fostered eagerness for innovation in industry.

He says that ultimately it is a question of convincing the population of the necessity of research. It has to be shown that technology guarantees jobs and enhances the quality of life. The "Research Days" on 18 and 19 June should also address this concern. On those days research institutes will open their doors to all citizens.

France: Aerospatiale Backs New Science Park for Advanced Materials

BR2204145894 Toddington NEW MATERIALS INTERNATIONAL in English Apr 94 p 6

[Unattributed article: "Science Park for Advanced Materials"]

[Text] A science park specialising in advanced materials is being set up in the Toulouse area of France through a collaboration between Aerospatiale (20 percent of capital) and local universities, administrations and financial institutions. Its aim is to encourage the creation of companies through innovation and research and thus generate employment.

So far, 20 million Fr has been invested in two buildings on the 35 hectare site and seven companies or organisations have set up offices there. These include DDF Pertec, a

specialist in computer memories, NDT Expert for nondestructive testing, and Aero Challenge which is developing sea planes.

The number of participating companies should rise to 20 or 30 over the next few years. University Paul Saboteur which also holds 20 percent of the science park capital, will collaborate with Aerospatiale on research related to the development of aerospace materials, particularly composites (to improve performance), light alloys and their corrosion resistance, as well as supersonic materials of the future.

EU Research Subsidies, Bureaucratic Obstacles Viewed

94WS0295A Stuttgar. BILD DER WISSENSCHAFT in German Apr 94 pp 88-89

[Interview with Martin Grauer, EU coordinator at Ulm University, by Wolfgang Hess: "European Prize;" initial paragraph is BILD DER WISSENSCHAFT introduction]

[Text] EU research funds: a thorny path with praiseworthy prospects. Everything that is connected with the European Union [EU] smells of bureaucracy and awkwardness. But Martin Grauer confirms that new prospects for research support are indeed opening up.

Hess: How much in EU research funding did you pry loose for your university in 1993, Dr. Grauer?

Grauer: The question cannot be answered as succinctly as you wish. It takes a great deal of time from preparation of a program, through adoption of it and all the way to the announcement and approval.

Hess: As long as years?

Grauer: It is certainly possible that it could take 18 months from handing in a project proposal to the completion of the research contract. If you also include the rigid deadlines, you have a not very innovation-friendly procedure. Another sore point is that the transparency sometimes leaves a lot to be desired.

Hess: Does that mean that an academic researcher without administrative knowledge is hardly capable of utilizing this source of funding?

Grauer: There are certainly scientists who have become clever enough throughout their career to get access to European funding. One must also not disregard linguistic and cultural barriers, which play a role in such an international project initiative. It makes a difference whether someone gives a talk in English and whether he conducts the negotiations and formulates an application in English.

Hess: So where are the actual barriers?

Grauer: For the EU it is by no means enough to document the scientific merit of the work. It is at least as important that the added value which is created by the European cooperation becomes clear. Furthermore, it is very important whether a concrete industrial project could develop out of it.

Hess: How long does an inexperienced researcher spend on a funding application to the EU?

Grauer: Several weeks are not unusual.

Hess: How many pages must be filled out?

Grauer: The application by a coordinator usually includes a dozen pages, of which seven copies must often be submitted. Applications by normal contractual partners are far less extensive, however.

Hess: As EU coordinator, are you unique or are you competing with hundreds of other university EU coordinators?

Grauer: In Baden-Wuerttemberg every academic institution has a coordinator who is trying to bring in the best for his school. These coordinators cooperate in a working group. Bavaria has a similar model. Other laender, however, have structured the work is such a way that each coordinator is responsible for a certain research program and processes the applications from all academic institutions in this sector. But I think that the Baden-Wuerttemberg model has major advantages.

Hess: For example?

Grauer: The most important thing is that one is able to help the scientists on the spot to get ahead. Personal conversation has enormous advantages over telecommunication when making applications, negotiating contracts or completing a project.

Hess: In would be even more interesting to know how much must be spent in order to acquire money. Ultimately, the taxpayer is responsible for your salary.

Grauer: The funds actually acquired by Ulm University in 1991 amounted to 200,000 German marks [DM], according to the vice chancellor's report. For 1993 it is likely to be as much as DM 2 million, however.

It is very difficult, of course, to quantify this work completely, because the EU coordinator is also a relay station between the economy and science—that is to say, between two partners who are able to derive many useful effects just by making a joint application. Through the contact with such programs small and medium-sized companies, in particular, climb to an ideal platform so that they are better able to exploit the European market.

Hess: One is always hearing that EU research projects with partners from Portugal or Greece, for example, have greater chances of being realized. Does that mean that top research within the EU framework is not necessarily the yardstick?

Grauer: Apparently this prejudice cannot be eradicated. I myself do not know of a single case to which the picture you paint applies. These countries also have outstanding working groups now.

Hess: Which tricks have you found by now in order to get access to EU money?

Grauer: No EU coordinator can offer a guarantee of a successful application. To begin with, the quality of the research work is foremost. But it is also just as important to stick painstakingly to the deadlines. Anyone who makes errors with that is immediately out of the race. In addition,

subordinate aspects apparently also play a role, for example the availability of forms. Sometimes it can be extraordinarily important to obtain the correct forms at the right time. But only someone who has established contacts over the course of time and makes the effort is able to wait for the best point in time.

Hess: What happens when you and your partners have filled out and sent off the application?

Grauer: I try to accompany the application on its way. For this as well it is very important to have cooperation with various contact places.

Hess: That means that you are present during discussions?

Grauer: No, but I maintain contacts with the participants.

Hess: So you make sure it follows a smooth path?

Grauer: I regard myself as someone who gathers information of current importance, prepares it and passes it on, meaning a service-provider. In this sense I also take care to achieve more transparency of the process.

Hess: Do you know researchers, who in view of the gigantic effort are so disgusted that they never again want to become involved with an EU project?

Grauer: The extensive application process and the comparatively modest rate of success have, in fact, led to major frustration with EU applications. Roughly calculated, only between 5 and 15 percent of the applications are approved. German scientists were long used to 60 to 70 percent from the German Research Association [DFG]. This low approval rate must not be regarded as negative, however. It can also be perceived as an expression of greater selection. But what the German scientists do not understand at all is that often even qualitatively high-rated projects are not supported.

Hess: Professor Robin Moritz at the Berlin Technical University even goes so far as to say: "For political reasons it is often not possible to predict which projects will be supported; scientific quality alone does not count at the EU."

Grauer: Scientific quality alone suffices only when it involves a national project. With EU projects the condition is to have a scientific partner abroad, who must be a part of it from the beginning. There are surely outstanding researchers everywhere in Europe. So transnational cooperation does not at all mean that the level drops.

Hess: How large is the EU's research budget?

Grauer: The fourth framework program of the EU is about DM 25 billion, which is to be made available from 1995 to 1998.

Hess: Are there pots of research funds in Brussels which are easier to crack than others?

Grauer: I would rate the probability of success for applications in communications technology higher than the success rate in medicine or in the Eastern Europe program. This is also due to the fact that the individual programs and program areas are supplied with money to very varying degrees. Information and communications technology, as well as materials and production technology, tie down the greater part of the EU support funds. Anyone who can occupy a niche in these fields has a better chance from the beginning than in an overcrowded program.

Hess: I do not detect any knowledge-oriented basic research here. Apparently there is EU support primarily for application-oriented research.

Grauer: Research supported by the EU has a decidedly precompetitive character, in which, in my opinion, research with longer-range orientation is somewhat neglected. Nevertheless, there are elements which demonstrate a model character for the EU support. Among them are project management. Clear goals are established by means of so-called milestones. Afterwards it is precisely analyzed whether and when the hoped-for goals were achieved.

Hess: Does that mean that the EU essentially takes a more careful look at whether that which the researcher has promised to achieve is actually accomplished?

Grauer: To begin with, one must promise something binding. Beyond that, the European Union Commission successfully establishes instruments of control or of research audits, which have proved themselves in businesses, for the research. This is more likely the closer to application the projects are. I also think that it is completely all right to take the aspect of European division of labor into account more extensively than before. In view of the greatly increased costs, it is necessary to concentrate the forces and to coordinate the research field, which was hardly the case before.

The result could certainly be a structural change not only in agriculture and industry, but in research as well.

France: ANVAR 1993 Grants Reviewed, 1994 Priorities Outlined

BR1204083494 Paris LE FIGARO (Le Fig-Eco Supplement) in French 1 Apr 94 p IV

["G.S." report: "ANVAR: 1.4 Billion Francs Fr in Aid for Innovation"]

[Text] ANVAR [National Agency for the Implementation of Research] Managing Director Henri Guillaume noted that, despite the economic crisis in 1993 the agency's network of small- and medium-sized companies [SME] kept up its search for innovation and maintained its levels of R&D investment.

He noted that the motivation of these small companies was precisely their desire to remain competitive and to develop "tight control over innovation as close as possible to market requirements." This attitude, which had already been apparent in 1992, reflects the extent to which they have adapted to the economic situation.

In this respect, the fact that partnerships are being developed (63 percent of the projects backed were set up in partnership with other companies or research centers, as

opposed to just 40 percent in 1990) is considered to be an encouraging sign. Projects are also increasingly taking on an international dimension.

Total of 3,682 Aid Packages

In 1993, the agency granted innovation aid worth a total of Fr1,422 billion, of which 1,293 billion went to companies. In all, 3,682 aid packages were given the go-ahead. Out of 1,000 aid packages for innovation, 56 percent were for SME's which had never before received aid, while 63 percent of pa kages went to SME's active in the so-called traditional sectors which ANVAR has prioritized since 1990.

Twin Priorities

This year, agency aid should top Fr1.5 billion, with an increase of 16 percent in payment credits. Henri Guillaume has set out two priorities for ANVAR.

First, there will be aid for young people. This aims to support a new product or technical process produced by one or more young people during their years in training, usually in partnership with a company: 978 such projects were implemented in 1993, for a total of Fr24 million.

ANVAR's second priority is to encourage SME's to take on researchers and research managers: The required qualification has been cut from six to five years of further education, and there is a ceiling on the aid granted to a company of Fr300,000.

German Government on Tax Measures to Stimulate Research

94WS0309A Duesseldorf HANDELSBLATT in German 12 Apr 94 p 6

[Article: "Tax Support for Research Neither Efficent Nor Practical"]

[Text] Duesseldorf—Federal Research Secretary Paul Krueger hopes to encourage research and development in business through tax incentives and quicker licensing. At the moment there are no special concessions to encourage research and development. In the opinion of the Federal government, the improvement in the general tax structure in the last few years (lowering of tax rates in the Status Protection Law, graduated tariff in business taxes, loss carried back and loss carried forward, relief in wealth and inheritance taxes) also strengthens Germany's "research status."

In its reply to a written question (printed matter 12/7116) the Federal government recalls the fact that special writeoffs up to a total of 40 percent off the costs of purchase and production can be claimed for movable consumable economic goods from fixed assets which are exclusively for R&D purposes. For real economic goods from fixed assets more than two-thirds of which are used for R&D, special writeoffs up to 15 percent are applicable. Economic goods which were purchased or manufactured before 1/1/91 are given preferential treatment. In each of the years 1989 and 1990 the loss in tax revenue amounted to DM200 million.

And in accordance with the Investment Allowance Law, of 1986 an investment allowance of 20 percent of the cost of purchase or production was granted for R&D investment under DM500,000, and an allowance of 7.5 of the costs of purchase or production which exceeded this amount. This investment allowance expired at the end of 1990. Losses in tax revenue in 1989 amounted to DM449 million and in 1990 to DM471 million.

For Berlin there were special regulations regarding investment allowances and writeoff concessions, but these too are no longer applicable to R&D being carried out today.

According to Para. 7d EStG (income tax law) increased depreciation up to 60 percent of the costs of purchase or production could be taken for economic goods which serve for environmental protection in the areas of waste water, air pollution, noise and solid waste during the fiscal year. Economic goods which were purchased or produced before 1/1/91 were given preferential treatment. The loss in tax revenue amounted to DM600 million in each of the years 1989 and 1990.

The Parliamentary Secretary of State for the Federal Finance Department, Dr. Joachim Gruenewald, said: "Tax measures to support R&D have been suspended or allowed to expire at the prescribed time in particular because of their lack of effectiveness, efficiency and practicality." He said that only a small portion of R&D expenses consist of depreciable R&D investment. A large proportion is the cost of personnel, which was already a business expense which could be immediately written off.

He said that investment support was only suited in a limited way as an instrument for the promotion of R&D. The attempt to differentiate favored usage for R&D purposes from non-favored production with the requisite precision was not successful by the end of the period when support measures were in force. A consequence of the legal uncertainty which had arisen, he said, was significant disagreement between the administration and business. He also said that unjustified claims to favored treatment had led to deception in competition.

The expiration of the increased writeoffs for environmental protection at the appointed time was confirmed by the decisions of the Federal government on tax reform in 1990. He said that subsequently this decision had been upheld in the context of the numerous newly introduced aids to reconstruction for the new Laender, some of which also made it prossible to encourage investment in environmental protection. The businesses are already obliged to incorporate environmentally friendly plants as a result of the increase in the environmental protection taxes (e.g. large furnace ordinance, TA for air). Accelerated execution of environmental protection measures could have been achieved by the increased exemptions.

Gruenewald had established that the increased exemptions for environmental protection according to para. 7d EStG were less favorable than the writeoff conditions for West Berlin and for the zonal border area and hardly more favorable than the writeoff possibilities for small and mid-sized businesses (para. 7g EStG). "Thus they have been used primarily by large firms outside Berlin and the zonal border area."

But he said that there was a series of special tax measures which fostered environmental protection, e.g. in the case of petroleum, the distinction made between leaded and unleaded gas, the regulations of the vehicle tax for the introduction of catalytic converters, the emission-oriented graduation of vehicle taxes for trucks or the tax breaks for expenditures for environmental protection. The petroleum tax, he said, was a disincentive for the use of fossil energy sources (gas, heating oil, natural gas) with the exception of coal.

The Federal Finance Department points out that in the non-tax realm a great deal is being done to encourage research and development in general and to encourage environmental protection in particular. Within the framework of the active program for greater growth and higher employment, for example, there is a tax-reducing credit program from the Credit Institute for Reconstruction in the amount of DM2 billion available for the encouragement of innovative activity in the German economy. They also point out that the 1994 Federal budget, including the expenditures of the Federal Department of the Environment, provided for funds of a good DM9 billion for environmental protection projects and for measures which improve the environment. In addition, they say that in 1994 environmental credits from the special ERP fund in the amount of DM2.6 billion and environmental credits from Federal banks (German Compensation Bank and Credit Institute for Reconstruction) in the amount of DM2.3 billion will be disbursed.

FRG To Provide DM100 Million Over 5 Years for Genetic Research

94P60196A Duesseldorf HANDELSBLATT in German 13 Apr 94 p 6

[Text] The FRG government intends to increase support for genetic research and to achieve quicker application of research results, as FRG Minister of Research Paul Krueger (CDU) announced on 12 April.

According to Krueger, it is already clear that the results of genetic research can alter important competitive positions of industry in the next few years. Bonn intends to expand its support efforts so that the advantages achieved for German industry by basic research can now be converted to products and applications.

Krueger said that an important step on this path is the new research focal point "Technology to Decode and Use Biological Blueprints," which is supposed to put genome research on an effective, technical basis. The FRG government plans to spend DM 100 million in the coming five years. The interdisciplinary plan is to intensify biomedical research and contribute to the fight against diseases which have been incurable up to now.

When presenting his proposal, Krueger called for more public attention for the "important and sensitive area" of genetic and genome research. The government views it as an extremely bad situation, when for example the approval process for using research results from this area takes six to eight years in Germany, but only a few months in the United States. This discrepancy must be eliminated, according to Krueger.

For Krueger, genome research is the basis for progress in biotechnology and medicine. Despite all backlogs which need to be made up, genome research in Germany too has developed during the last five years into a key innovative area in modern biology. The focal point comprises the problems of decoding and using the biological blueprints which exist in molecular form as genetic information in the cells. With the help of genome research, it will be possible to put medicine, industry (especially the pharmaceutical industry) and agriculture on a "new scientific-technical basis."

The Minister of Research expressly stated that the further development of genome research in Germany will be accompanied by laws setting conditions. An area which must be particularly protected is information on the genetic makeup of a person. According to Krueger, the emphasis is on legislation which would ensure effective data protection and prevent any misuse. There will be no "transparent person," concerning which there have been many warnings. There are already drafts by the federal government to amend the penal code or the work protection law.

Experts at the German Internists Congress have advocated the increased use of genetic technology in medicine. The Cologne cancer specialist Volker Diehl said in Wiesbaden on 12 April that numerous promising therapies using genetic technology methods will soon undergo clinical testing. Genetic therapy is often the last chance to help incurably ill persons, he said.

Medical science has the "missionary urge" to move forward, said Diehl. However, it was a mistake by the scientists not to have made clear to the general public what the goals of genetic technology are. It is only a question of treating diseases with genetically improved materials or cells, he said. A doctor from Ulm, Hermann Heimpel, said that genetic manipulation of human genetic material is prohibited throughout the world and not allowed by scientists. However, he said, it was an open question whether this consensus would still exist 20 years from now.

Technical Developments by FRG Large Research Institutes Noted

94WS0319C Duesseldorf HANDELSBLATT in German 13 Apr 94 p B3

[Major Research Facilities-Genetic Engineering Provides Far-Reaching Perspectives]

[Text] The Working Association for Major Research Facilities (AGF) is presenting at the "Innovation Market of Research and Technology" at the Hannover Trade Show '94 forward-looking plans for research and development in medicine, the environment, climate, geosciences and data processing as well as examples of technological innovations from the fields of information and communications technology, thin-film technology and magnetic suspension.

The 16 major German research facilities which have around 22,000 employees carry out work in research and development in natural science technology and biomedicine, especially in fields requiring interdisciplinary cooperation and a concentrated employment of personnel and equipment. They make substantial contributions to federally funded programs in the fields of energy research and technology, materials research, information and communications technology, environmental protection technology and environmental technology, transportation and traffic systems, aviation and space research as well as oceanic technology and geosciences.

Some plans in research and development will be presented at the Hannover Trade Show as examples taken from the wide-ranging main focal points in R&D at the major research facilities.

Practical Consequences for Cancer Therapy in Sight

The goal of this presentation is to draw attention to recognizable, long-range effects; to pursue a dialogue with business, politics and society at an early stage of development; to suggest future important problems; or to directly approach possible partners for cooperative work.

Medical developments in genetic engineering presented jointly by the Society for Biotechnological Research (GBF), the Max Dellbrueck Center (MDC) and the German Cancer Research Center (DKFZ) are one example with far-reaching prospects. Knowledge about molecular changes which occur in various human diseases is still very timely and speculative today. All indications are that a single genetic alteration is not sufficient to give rise to complex diseases such as cancer. Rather, chains of several events in the same cell seem to be necessary. The developments in genetic engineering today are thus intensively involved with molecular biological studies of such "chain events," with cloning bio-genetically active substances and with controlling the growth cycle of cell cultures, as a prerequisite for later industrial production.

Earlier plans in research and development are already showing practical results today for diagnosis and treatment—for example, in cancer therapy and in the treatment of cardiovascular disease. However, no one can now estimate how long it will still be until a diseased cell can be transformed into a healthy cell using the tools of genetic engineering.

The progress which has been made—not only in medicine—with the analysis of [computer]-stored test data is concrete. Visualization of stored computerized data is already opening up new possibilities today for localizing, recognizing and understanding procedural sequences in brain research, as an example.

With complicated events such as flow processes, however, the analysis—and its visual presentation—of huge amounts of data runs into serious difficulties. Still, it is in the area of weather forecasting that the Society for Mathematics and Data Processing (GMD) in cooperation with the European Center for Medium-Term Weather Forecasting (EZMV) has succeeded in preparing the Integrated Forecasting System (IFS) program—which is used daily to predict the weather in Europe—so that it can be used on the fastest massive parallel system currently available. Faster and, above all, better weather forecasting is thus in sight, with long-term forecasting and three-dimensional simulation of global weather events possible.

Spectrometer in Satellites Tracks Down Pollutants in Ocean Waters

Satellites also play a decisive roll in improving weather forecasting. They provide the decisive initial data and the survey pictures important for weather events. They also carry out essential tasks for environmental research and the geosciences such as surveilling the oceans and continents, monitoring the polar caps and tracking down damage to vegetation.

The German Aerospace Research Institute (DLR), the Potsdam Geo Research Center (GFZ) and the Geesthacht GKSS [expansion unknown] Research Center are introducing the prototype of the most powerful European Remote Sensing Satellite, ERS-1, thus far and its functions.

The microwave measuring instrument PRARE—Precise Range and Range Rate Equipment—will fly along with the ERS-1 successor, the ERS-2. PRARE—a development with which GFZ was involved to a substantial degree—is used for centimeter-precise measurements of a satellite's orbit. The system is already currently orbiting the earth on board the Russian Meteor-3 satellite.

The MARAS (Marine Radiometric Spectrometer) system introduced by GKSS can also be used in satellites; this system can offer clues about optically active organic and inorganic substances in water by means of a spectrometric analysis of the color of the ocean's surface. An underwater version [of this system] has in the meantime also been successfully tested.

From the broad palette of environmental metrology, the Leipzig-Halle Environmental Research Center (UFZ) is presenting a measuring device the size of a cigarette package which is used for the rapid on-site analysis of phenol. Specially developed one-way planar sensors form the basis of this device.

Major research facilities are making important contributions not only in environmental research by also in information and communications technology, in such things as the development of new components and in super broad-band amplifier technology. In this regard, the new trans-atlantic fiber-optic oceanic cable connections and those running through the Pacific use in their terminal land stations a super broad-band amplifier technology developed for ultrashort signal processing by the Hahn Meitner Institute (HMI). The licensee SHF Design has already produced applications in high-speed laboratories and other special uses for data transmission systems. Partners in industry are being sought for other applications of interest to business and technology.

The Karlsruhe Nuclear Research Center (KFK) is presenting innovations in thin-film technology [offering] a broad range of possible uses. The micro-magnetostrictive

switch is a newly developed actuator element for microsystems and medical technology which can be used as a mechanical or electric switch, as a membrane for micropumps or micro-valves.

Numerous Innovations in Thin-Film Technology

A credit card-sized microsystem with six accelerometers measures acceleration on the x and y axis on, for example, building sites, in geology or in the transport of goods.

Various coating concepts in rigid PVD coating of tools and components make it possible to make surfaces with precisely predetermined characteristics such as hardness, adhesion or toughness. The production of high-temperature super-conducting films with defined stoichiometric composition and high separation rates means high quality and economic efficiency.

Large surface electron-beam coating of various substrates (metals, alloys, inorganic or organic materials) can be used, for example, for coating medical implants made of titanium with aluminum oxide, electric contacts and piezoelectric coatings for microelectronics. Licensees, cooperating partners and users are still being sought for these developments in thin-film technology.

The Juelich Research Center (KFA) has a presentation on magnetic suspension, a technology with a future. The development of magnetic materials with increasingly higher energy densities and decreasing prices for use in electronic control elements gives reason to expect wide application of permanent magnetic suspension in the future.

Development of magnetic suspension using the Juelich KFA magnetic suspension system has by now already led to numerous licensed products. Some examples include a gas friction vacuum gauge for pressures from 10_{-8} to 1,000 mbar; turbo-molecular pumps developed with the Laybold Company have even displaced rival Japanese products in various places; a hot-wall crystal pulling installation for gallium arsenide crystals is in the pre-industrial testing stage.

Magnetically suspended textile spindles in a new type of spinning process for textile fibers, being developed with partners in industry, should double the rate of production of quality spun yarn compared with the current leading ring spinning process. Work is currently being done on the development of magnetically suspended flywheel-energy storage for providing emergency power and on electrically-powered automobiles. The Juelich Research Center (KFA) is interested in cooperative [ventures] with other high-tech companies and users.

The major research facilities are open to dialogue with industry and furthermore are for a variety of developments looking for cooperating partners, licensees and contacts with those who would use and have need [for such developments.]

Dr. rer. nat. [natural sciences] Wolfgang Heidrich and Prof. Dr. Rolf Theenhaus, Juelich Research Center.

France: S&T Research Issues Debated

Manifesto of Scientists Sets Principles

94WS0330A Paris AFP SCIENCES in French 14 Apr 94 p 1

[Text] Paris—Some 1,200 figures from the science world, including some fairly illustrious names, have already signed a "Research Manifesto" described by its authors as the first and "only authenticated expression of the views of scientists" since 1976. The document was made public on 14 April, four days before the national consultative debate on the broad objectives of French research. The debate, which was launched by Francois Fillon, is scheduled to be held at the Cite des Sciences and de l'Industie de La Villette, in Paris.

The text, which its authors say "is not a diatribe," but the expression of "what the scientific community feels and lives on a daily basis," was submitted to the minister of higher education and research before being given to the press. It will be sent to all parliamentary groups in preparation for the debate on research scheduled for June. It could also be used to help prepare the 1995 budget, but is much broader in scope. Indeed, the manifesto touches on all the problems that will face French research at the turn of the century, as experienced first-hand by those who signed it. The latter include laboratory directors; members of scientific committees, the National Council of Universities, the College of France, and the Academy of Sciences; and university presidents....

The manifesto proclaims six "principles on which there is broad consensus" within the scientific community. It insists on "the need for a multiannual research bill that should call for regular growth in various types of scientific employment and a gradual rebuilding of the resources" allocated to research. The text is still circulating in scientific and university bodies. According to one of its authors, Henri-Edouard Audier, a professor at the Polytechnical School and board member of the National Center for Scientific Research (CNRS), it has been "widely approved" and used as a basis for more "targeted" texts composed by different organizations or researcher and teaching-researcher circles.

Among those who signed the manifesto are 33 of the 40 section presidents of the National Scientific Research Committee; 6 of the 10 science committee presidents of INSERM (National Health and Medical Research Institute); 22 of the 28 members of the CNRS science council; 15 science university presidents (Paris-VI, VII, VIII, IX, XI, Marseille-I, Toulouse-III, Nancy-II, Montpellier-II, Saint-Etienne, Mulhouse, Brest, Poitiers, Rouen); and 30 section presidents of the National Council of Universities.

According to the authors of the manifesto, France must:

—insure greater interaction between research to expand knowledge and directed or applied research;

—encourage scientific debate, to promote desirable changes;

—strengthen and adapt the French research system;

—encourage voluntary collaboration at the most basic levels;

—catch up in non-military research, closing the gap rather than widening it;

—and preserve research occupations and upgrade their status.

"We must start now," says the manifesto, "to anticipate the great attrition through retirement of researchers, engineers, and technicians that will occur in the scientific community over the next 10 years; recruit young, unemployed graduates or those threatened with job loss; and prepare the future to prevent whole segments of French research from disappearing around 2003-5."

Official Reactions

94WS0330B Paris AFP SCIENCES in French 21 Apr 94 pp 1-3

[Text] Paris—Speaking to participants in the "National Consultation on Broad Research Goals" debate at the Cite des Sciences et de l'Industrie de la Villette in Paris 18 April, prime minister Edouard Balladur affirmed the government's desire to "restore research to its rightful place in society." The prime minister, whose statements were later seconded by higher education and research minister Francois Fillon, acknowledged the "strategic importance" of research, which extends far beyond its economic repercussions.

Balladur and Fillon stressed, in the prime minister's words, the "real challenge of better integrating itself into society that science must set for itself." "Scientific research and technological development are assets in overcoming the recession," insisted Fillon, provided that [they] "meet the challenge which a certain climate of pessimism poses to progress," and that the scientific community "avoids the temptation to become disenchanted." For science and society to get on together again, they must "move ahead in concert." And, emphasized Balladur, there must be a good fit between society's "needs and what the research world has to offer."

To define the necessary "clear objectives," added the prime minister, who was speaking to the scientific community for the first time, "We must redefine the role and place of public research organizations." The making and implementation of decisions must be decompartmentalized, through "continuous, open-ended concert" between politicians, scientists and manufacturers. Prime minister Balladur cited the French space program as an example.

The problems are complex, numerous, and poorly perceived, while the solutions are unclear. Consequently, we must "redouble our efforts to spread the scientific spirit, popularize science, and draw the public into scientific debates," insisted Fillon. "The research world must therefore communicate, ceaselessly explain (...), and thoroughly adapt itself."

"The state," for its part, "must start investing in research again, but in a different way." The government must take into greater account the key role of laboratories and researchers and delegate more "without abandoning its power of orientation." For Fillon, defining a research strategy "means, first and foremost, maintaining and increasing state funding of research." In his view, the state is the only entity that can "clarify what is at stake, decide on a strategy, and help implement it," once the strategy has been defined in conjuction with the players and users of science.

The higher education and research minister, who is slated to present an orientation report to the government in early May, believes research strategy "must be drafted so that it is consistent with sector policies" for public health, the environment, transportation, telecommunications, energy, and agriculture.

Once again, the prime minister and minister Fillon expressed their regret at industry's inadequate investment in research. The use of new discoveries and technologies will not boost companies' competitiveness unless they hire young people trained in and by the research world, who will be able to make them feel the importance of innovation.

Fillon promised to eliminate administrative obstacles to the free movement of researchers back and forth between teaching and laboratories, and also between public and industrial labs. The large number of projected retirements will have to be offset by "continued recruiting efforts."

National consultation seems to have sparked a healthy dose of reflection and real introspection among members of the research community. Launched six months ago by Fillon, consultation actually began in February with the sponsoring of six symposia, in Marseille, Grenoble, Bordeaux, Strasbourg, Le Mans, and Lille. The colloquia attracted 2,760 people, including organization directors, university professors, researchers, and manufacturers. In addition, the CNRS organized another 18 in-house symposia; INRA (National Agronomic Research Institute) and the Atomic Energy Commission sponsored some as well;, and several hundred pages of 400 written opinions, including some from trade unions, were submitted.

The questions raised almost six months ago include what to do, how to do it, and why; how to maintain the excellence of French research; how to transfer findings to industry; and how to pursue, expand, or start up productive joint ventures with developing, former East block, Asian "little dragon," or friendly and rival industrialized countries. The issues were raised in particular in the report submitted to the scientific community and studied in regional colloquia.

The responses or lack thereof and the questions added by participants were analyzed by a six-person group presided by Guy Aubert, director of the Lyon Ecole Normale Superieure. The result was 57-page summary report that was the focus of the final debate.

National consultation has spotlighted the problems, needs, and hopes of a community on which much of the country's economic and industrial future depends. Some 1,200, including some of the most prestigious, members of the research community highlighted their concern and mobilization by making public a "Research Manifesto" on 14

April. The document demanded in particular that the government pass a "multiannual bill" for research.

But Fillon has promised that consultation will continue. It will go on up to and after the minister presents his Orientation Report to the prime minister in early May, in preparation for a parliamentary debate on research policy scheduled for June.

At the close of the summary debate, Fillon stressed that he had wanted to take a "pragmatic step," refusing to participate in "outmoded ideological debates," especially those indulged in by big organizations. He said he prefered to take into account ongoing changes in mentalities. "Reforms cannot be forced," he stressed. "Reforms come about naturally, as problems become international in nature."

Boxed Material: Fillon's Reaction to the "Research Manifesto"

On 14 April minister Fillon reacted to the "Research Manifesto" made public that morning by making the following remarks to the French Press Agency. "It is a document I could sign myself, give a take a few words. The text is really very close to my own ideas. Under the circumstances, I consider it a positive attempt to participate in the National Consultation on broad research goals, and I am adding it to my report, since through the Manifesto 1,200 researchers tell the minister what their conception of research is."

The "Manifesto" will therefore be among the documents used to prepare the government's position, which will be submitted to the Parliament during the research debate in June.

After expressing his regret that the Manifesto was styled by its authors as "the only authenticated expression of the views of scientists," Fillon asserted that his motives had been "unfairly attacked" by those who claim that consultation would necessarily lead to "negative conclusions for research."

"Apart from their refusal to take part in the consultation, and their conclusion that an appropriations bill is needed, I find the Manifesto both moderate and close to the notions of the government." And the minister invited its signers to attend the parliamentary debate, when "they will see whether or not the minister rejects their conceptions."

France, Israel Sign Space Cooperation Agreement

BR0905101994 Paris AFP SCIENCES in French 14 Apr 94 p 5

["Cooperation Agreement Between CNES and Israeli Space Agency"]

[Text] Paris—In Tel Aviv on 11 April, the National Space Research Center [CNES] and the Israeli Space Agency (ISA) signed a three-year cooperation agreement that could be extended by mutual understanding. The agreement was signed by the CNES Managing Director Jean-Daniel Levi and his ISA counterpart, Mr. Marcel Klajn. It had been discussed during February's visit to Israel by French Foreign Minister Mr. Alain Juppe.

This is not the first cooperation agreement between Israel and France: the Amos satellite was manufactured by the Israeli aeronautical industry in association with Alcatel (France) and Dornier (Germany). It is to be launched next year on an Ariane rocket.

According to the terms of this "arrangement defining a cooperation framework in the field of space activity," the two agencies will cooperate "for the use of space for peaceful ends and for economic and scientific development."

The agreement should also make it possible to encourage cooperation projects between the two countries and their industries in this field. It will cover space research in the fields of astronomy, solar system exploration, earth science, biology, and space medicine and physics in microgravity.

It will also concern applications for earth and environment observation, meteorology, environmental data collection and localization systems, communications, and satellite positioning. The two agencies will moroever cooperate in the sectors of space technology relating to robotics, small satellites, space technology, and problems of quality and reliability. Cooperation will be coordinated by a mixed committee backed up by expert working groups.

France: CNRS Chief Quizzed on National Consultation

BR2204140194 Paris LE FIGARO in French 15 Apr 94 p 12

[Interview with Francois Kourilsky, French National Scientific Research Center managing director, by Jean-Luc Nothias; place, date not given]

[Text] The national process of consultation on the major aims of French research, launched by Higher Education and Research Minister Francois Fillon, is now drawing to a close. Begun in June 1993, the process consisted of a series of meetings of "ad hoc" working groups, a policy report, and regional seminars. It is to present its conclusions next Monday [18 April] at the La Villette Science and Industry Park during a "national synthesis debate."

Prime Minister Edouard Balladur is set to make a much-awaited speech which will be the yardstick against which the research community will be able to measure the extent to which the politicians intend continuing strengthening the human and material resources of French science. The CNRS [National Center for Scientific Research], the country's leading multidisciplined research body, has played a key role in these debates.

In this article, CNRS Managing Director Francois Kourilsky presents the results of these discussions and some of the concrete proposals that will feed Monday's debate. He is all the more free to do so since his term of office (his second three-year term) ends on 19 July. In addition, the research manifesto that was published yesterday has been signed by 1,200 leading figures in the scientific world, members of scientific committees, the National Universities Council, the French College and

Science Academy, and university presidents. This document, which, according to its authors "is not a pamphlet," but the expression of "what the scientific community feels and experiences in day-to-day life," was first sent to the higher education and research minister. The manifesto insists on "the need for a multiannual research law providing for regular growth in employment in the various scientific domains and a progressive rehabilitation of the resources" that are attributed.

Nothias: What was the effect of the national research consultation process for the CNRS?

Kourilsky: In France, each time there is a major national process of consultation, we note that a number of changes have come about which were not necessarily the changes we were expecting. Thus, at the 1982 "Research Assizes" we had envisaged a major reform in public research. What in fact happened—and it was a magnificent result—was that public and industrial research became reconciled! It is possible that, in this national process of consultation launched by [Research Minister] Francois Fillon, we are seeing public research and social demand meeting up again. We are also seeing the coming together of university research and its public research mission, in harmony with the reconciliation of research bodies.

Nothias: What is the most important conclusion you can draw from this debate?

Kourilsky: The CNRS played a very active role in this process of national consultation. The meetings, seminars, and debates clearly showed the CNRS that researchers are very much aware of the gap that exists between research and society. To better understand social demands and needs, research policy must be subject to a high level of criticism and judgment based solely on a consultative and forward-looking policy. This is because social demand cannot be an excuse and research must have balanced aims. Research must be able to differentiate between trends and real requirements, to define what is feasible and what is possible, and make the unavoidable choices. In the area of health, for example, we cannot focus solely on AIDS, solely on genetics, or solely on cancer.

Nothias: What are the main brakes on development?

Kourilsky: First we should clarify and restate the missions of the research bodies because, as things stand, much of their work, it appears to us, lacks coherence. Thus, the CNRS, as the leading multidisciplined basic research body has naturally acquired the means of performing applied research. At the same time, the bodies created to apply research or to accompany industrial development have tended toward basic research. As a result, there is some confusion about roles and missions. The fact that, in recent years, different French ministries have created a large number of research bodies whose size is not always in proportion to the work in hand—and sometimes there are several such bodies operating in the same sector— indicates that we have to again find a degree of coherence.

Nothias: The relationship between the research bodies and the universities seems to pose a problem. What links should be established?

Kourilsky: Discussions have focused to an almost exaggerated extent—although not wholly without positive effects—on relations with the universities. There appears to be a greater need for change in higher education than in research. However, everyone agrees that we have to respect the professionalism that exists on both sides. An unavoidable consequence of this is that we have to find a way to make people on both sides more professionally mobile. The vast majority of people are in favor of the idea of "sequential careers." However, the mobility problem can only be resolved by drastically relaxing our regulations, our status as a public concern, and our habits. Such sequential careers could also be envisaged in relation to private research or other research bodies. But I should stress that the notion of full-time research must be restated and maintained. To do away with it would be a catastrophe.

Nothias: What problems have you identified on the relationship between research bodies and the supervisory authorities?

Kourilsky: In France, government supervision of research bodies is much greater than in Germany or Britain, for example. Clearly, the political powers must be capable of steering, and have the resources for implementing and following, a research policy. We have to ask, though, why the many ministries intervene so poorly in the strategy and yet to such a great extent in the scientific management of research bodies and universities that lack autonomy.

Nothias: Why do you question that?

Kourilsky: Because it creates risks for research. Thus, peer evaluation has been fully tried and tested. It can now be improved by giving the committees a more international aspect, creating a structure for appeal against their decisions and by reforming the way in which these committees are set up. Why is it that, in France, scientific experts are appointed to the committees by politicians and not the management of the research bodies as they should be? At the same time, the election of experts by the management committee should be reformed.

Nothias: In your view, is French research doing well overall?

Kourilsky: Yes. The research doing less well in France, especially in comparison with our neighbors, is clearly industrial research. While it still represents almost half the work done in French research, it is not yet strong enough in the overall industrial fabric. Vigorous remedial action is needed. Let us hope we will see this action result from this consultation process. Public research needs financial investment on a par with that given by other major industrial countries. France lags behind slightly from this point of view. In 1984 we tried unsuccessfully to aim at an ambitious 3 percent of GDP for research (we currently have 2.4 percent). I wonder what the government's future objective is...

EU: Evolution of Pharmaceutical Industry Assessed

94WS0321A Paris LE MONDE in French 19 Apr 94 p 8

[Article by Dominique Gallois: "The Turning Point"]

[Text] "Although the 20-year boom in the pharmaceutical industry is coming to an end, the overall market should continue to grow. If macrotrends continue, growth will hold steady at 9 percent a year between 1993 and 2000; if they do not, rates will drop to only 0.5 percent."

These two scenarios presented by Eurostaf in its study of "The World Pharmaceutical Market on the Eve of 2000" confirm the end of double-digit growth for the industry. In Eurostaf's opinion, "the slowdown results from increased competition, harsher health policies, a drop in the number of big patents, and shrinking innovations. It is partly offset by free market prices for over the counter drugs (OTCs), increased self-medication, the high unit prices of innovative heavy chemotherapies, and the epidemiological variable." The change has already made itself felt in both the ledgers and strategies of big pharmaceutical groups.

In Europe, firms doing business in Germany and Italy have been particularly affected by those two countries' restrictive health policies. The pharmaceuticals division of Hoechst, for instance, has posted a drop in sales that is linked directly to the price cuts brought about by German health minister Seehofer's reform, and to the attitude of physicians, who have prescribed low-cost drugs. Likewise, Rhone-Poulenc-Rorer's export performance in those two countries, though still "decent," was not as good as expected.

In contrast, the British have done well at exporting, thanks to the devaluation of the pound. Zeneca, a product of the ICI split, boosted its sales volume 3 percent and its prices 1 percent in 1993. The devaluation of Britain's currency is responsible for two-thirds of Zeneca's growth in sales and one-third of its increase in profits. Glaxo Holdings posted a 22-percent increase in profits—outstripping the predictions of analysts—in the second half of 1993. In the United States, reaction to President Clinton's health reform plans in 1993 prompted big groups to shift back to the distribution of pharmaceutical products. Top international manufacturer Merck anted up 6 billion dollars to acquire the wholesaler Medco, and posted increased earnings at the end of the year. Its profits jumped 9 percent from one year to the next, climbing from 1.98 to 2.16 billion dollars on sales of $10.4 billion. The increase in the price of medications had no effect on the sales of Merck, whose growth resulted from an increase in volume and productivity gains.

Bristol-Myers Squibb also enjoyed an jump in profits, despite a $310 million reserve to settle a lawsuit. The final total, which would have been $2.26 billion without the legal action, came to $1.95 billion, against $1.56 billion in 1992. But laboratories are still worried about the government's desire to hold down health spending.

The same desire is evident in Japan, whose inhabitants boast the highest per capita consumption of medications in the world. The cost of drugs was trimmed 9.2 percent in 1990, 8.1 percent in 1992, and another 6.6 percent on 1 April, 1994.

Pharmaceutical groups are faced with two challenges: focusing their research to deal with high costs, and gaining control of their distribution networks to take advantage of the growing trend toward self-medication. The push for alliances that has been evident since the early nineties should mount.

The World's Top Twelve

4,096	Rhone-Poulenc-Rorer	France/USA
4,313	Eli Lilly	USA
4,341	Johnson & Johnson	USA
4,460	American Home Products	USA
4,693	Ciba-Geigy	Switzerland
4,705	Smith-Kline Beecham	Great Britain/USA
4,865	Sandoz	Switzerland
4,887	Roche	Switzerland
6,095	Hoechst	FRG
6,203	Bristol Myers Squibb	USA
7,786	Glaxo	Great Britain
8,114	Merck & Company	USA

France: ANVAR's 1993 Balance Sheet on Materials Project Outlays

94P60253A Paris COMPOSITES ET NOUVEAUX MATERIAUX in French 20 Apr 94 pp 3, 4

[1993 ANVAR Balance Sheet on Materials]

[Text] In 1993, of the 1.293 billion francs ANVAR (National Association for Research Exploitation) has outlaid to support innovation, 247 million went to 226 materials-related projects. It must be noted that it would be very hard to list (all) programs specific to materials existing at many levels within the projects submitted to the Agency. Still, 247 million francs were granted in 1993 to "materials" projects, to which one must also add the diverse financial interventions for innovation support services (15 million francs), the specific support for contracted materials research associations (SRC) (15 million francs), and for PMEs (small and medium sized companies) hiring researchers (cca 6 million francs). All in all, 280 million francs, i.e. 19 percent of ANVAR's budget has been devoted to materials research.

In reference to the level of interventions, the observation shows that this aid has been essentially intended for materials transformation and applications, and much less for development, because the latter is still the prerogative of large industrial groups. Of all the materials categories, metals, alloys—a good quarter of projects—and polymers—over a third—receive most of the "subsidies," followed next by the organic matrix composites with around one fifth of projects. The above breakdown reflects well the preeminence of the so called "traditional" materials among the projects submitted to ANVAR.

Contrary to these observations which may be made on all the projects submitted to ANVAR, only ten projects have profited from materials by becoming the object of aid transfers. Example of a successful subsidy, France Reducteurs' composite-made gearbox.

In the framework of aid to innovation, France Reducteurs has been among the associations supported by ANVAR. After having benefited from development aid in 1991, in 1993, France Reducteurs received the aid for an innovation project. What is this company specialized in? France Reducteurs is manufacturing a line of gear boxes made of composites. The initiator of the company has been a man who wanted to profit from the market knowledge he gained at a PME specialized in injected plastic molding treatment subprocess—Vandee Plastique—and on his experience as an entrepreneur. So, he called on the good offices of ANVAR and, in 1991, launched France Reducteurs, a company specialized in composite-made gear boxes coupled with clutches—patent pending. This consists of a transmission system inserted in the kinetic chain of diverse professional-, public- or do-it-yourself-use powered outdoor machines.

When it was created, France Reducteurs had 25 employees and a 250 thousand franc capital. The first year's financial balance sheet showed an 8 million franc turnover. A year later, the company's personnel has doubled. In order to conquer markets abroad, in 1993, the company called again on ANVAR to benefit from the innovation support, to develop a line of clutches, reverse gears and brakes.

The firm's strategy is simple: extreme specialization in this field combined with product reliability and cost improvement. The company's marketing strategy is target oriented: canvassing the thirty European manufacturers.

EU: Forty-Two Million Dollars for Biology Research Approved

94WS0332A Paris AFP SCIENCES in French 21 Apr 94 p 32

[Text] Paris—The management committee of the International Human Frontier Science Program (HFSP) has allocated $42 million in 1994 to biological research programs, announced the program's organization on 19 April in Strasbourg.

This year, research funded through subsidies and grants to science teams will focus on brain functions and molecular approaches to the study of biological functions.

Proposed by the Japanese at the G7 summit in Venice, in June of 1987, the HFSP seeks to promote basic research to explain the mechanisms at work in living organisms. Japan will continue to supply about 80 percent of the funding this year. North America and Europe will each kick in 10 percent.

All applications to the HFSP are examined by prominent scientists from around the world, who meet every year in Strasbourg. The program's entire scientific management is supervised by a council headed by Professor Klaus-Peter Hoffmann, of the University of Bochum in Germany. In 1994, the HFSP will award 40 research grants to fund scientific collaboration among teams from different countries, out of a total of approximately 28 million dollars over three years (11.4 percent of applications).

Fourteen of the grants are set aside for brain research and 26 for the molecular study of biological functions. They must be awarded to at least two teams from different countries that can show a legitimate need to collaborate.

The HFSP will also award 160 two-year university grants (26 percent of requests) to "post-doctoral candidates" who wish to work in the laboratory of another country. The students will receive annual grants of about $40,000 for two years.

France: Balladur, Fillon Cited on S&T Research Policy

BR1105090694 Paris AFP SCIENCES in French 21 Apr 94 pp 1-2

["Mr. Balladur Says Research a Strategic Factor for France"]

[Text] Paris—On 18 April, Prime Minister Edouard Balladur and the Higher Education and Research Minister Francois Fillon told participants in the "national consultation on major research objectives" debate at the La Villette Science and Industry Park that the government wanted to "return research to its rightful place in society," recognizing that it is a "strategic factor" whose importance goes beyond its economic consequences.

Balladur and Fillon both stressed what the prime minister termed "the real challenge to which science should rise to ensure it occupies more of a central role in society." Mr. Fillon said: "Scientific research and technological development constitute a major advantage that we can use to pull us out of the crisis, on condition that they can rise to the challenge that pessimists throw in the path of progress." He added that the scientific community "should not give in to the temptation of disillusionment." Mr. Balladur stressed that for science and society to once again form a happy union, they must "walk in step" and the right balance must be struck "between the needs" of society "and what the world of research has to offer."

In his first speech to the scientific community, the prime minister added that to have the necessary "clear objectives, we have to redefine the role and place of public research bodies," and departition decision making and implementation through "permanent and evolving concertation" between politicians, scientists, and industry. By way of an example in this respect, Mr. Balladur cited the French space program.

The problems are many and complex, ill-perceived, and with scarcely evident solutions. As a result, Mr. Fillon said, it is necessary to "redouble our efforts to extend the scientific spirit, and make science more popular to bring the general public into scientific debate. The world of research must therefore tirelessly talk and explain (...) and undergo deep-seated change."

For its part, "the state must again take a stake in research, but at a different level" that better takes account of the central role of laboratories and researchers, and should delegate to a greater extent "although without giving up its powers for laying down guidelines." For Mr. Fillon, the definition of a strategic vision in the field of research

"depends firstly on maintaining and increasing the state's financial contribution to research." To his mind, the state is the only body that can "clarify the stakes involved, determine a strategy, and participate in its implementation," once this has been agreed on with scientists and end-users.

The Higher Education and Research Minister, who is to present a guideline report to the government in May, continued by saying that this strategy "must be defined in a way that is coherent with sectorial strategies" in the fields of public health, the environment, transport, telecommunication, energy, and agriculture.

Both the prime minister and Mr. Fillon once again expressed their concern at the lack of support for research from industry. Inventions and new technology will only increase the competitiveness of companies if they employ young, trained researchers capable of showing them the importance of innovation.

Mr. Fillon promised to remove the administrative obstacles blocking the mobility of researchers, links between research and education, and free movement between public and industrial laboratories. The many upcoming retirements have to be compensated, he said, by "continued recruitment efforts."

The process of national consultation appears to have generated a healthy reflection and a truly introspective look by the members of the community. Launched by Mr. Fillon six months ago, the process in fact began in February with the organization of six colloquiums—in Marseilles, Grenoble, Bordeaux, Strasbourg, Le Mans, and Lille—attended by 2,760 people (directors of scientific bodies, universities, researchers, and representatives of industry). In addition, 18 internal colloquiums were organized by the national scientific research center [CNRS], the national agronomic research institute [INRA], and the Atomic Energy Commission [AEC], and 400 papers have been written (totalling several hundred pages), some of which were submitted by trade union organizations.

A number of questions were asked almost six months ago, most notably in the report submitted to the scientific community and examined at the regional colloquiums: What should be done? How should things be done? What are the aims? How can the excellence of French research be maintained? How can results be transferred to industry? How can we continue, improve, or launch fruitful cooperation projects with developing countries, former eastern bloc countries, the Asian "dragons," and other industrialized countries that are both friends and competitors?

The answers received, or the lack of answers and additional questions posed, were analyzed by a group of six chaired by Mr. Guy Aubert, director of the national senior teaching school in Lyons, which then drew up a 57-page summary report which formed the centerpiece of the final debate.

The consultation process highlighted the problems, needs, and hopes of a community that will, to a large extent, shape the economic and industrial future of the country. Some 1,200 researchers, including some of the most prestigious names in the field, on 14 April published a "Research Manifesto" as a sign of their concern and mobilization. This notably asked the government to devise a "multiannual law" in this domain.

France: Fillon Advocates Setting Up Exploratory Committee for Space

BR1105091094 Paris AFP SCIENCES in French 21 Apr 94 p 6

[Unattributed report: "Toward the Creation in France of an Exploratory Committee for Space"]

[Text] Paris—On 18 April, Higher Education and Research Minister Francois Fillon indicated that, in a few weeks' time, an interministerial committee is to look into the creation of an Exploratory Committee for Space.

A project dear to the prime minister, the creation of this committee corresponds to the need to try and define the major long-term objectives of the French space program given French participation in international programs through the European Space Agency [ESA] and bilateral agreements with a number of countries.

The committee would not have to deal with space applications for telecommunications or defense systems, but would be charged with providing a strategic view of French space policy. Given the major investments in space technology—which account for one-third of the civil research and development budget—the government thought it necessary to have a committee of leading figures who would be free from the shackles of any structural entity to talk openly and voice their opinions on the main aims of space research.

For example, they would consider whether or not we should continue exploring the planets, by what means, and through what cooperation agreements. According to Mr. Fillon, the construction of the international R-Alpha orbiting space station is not a strategic aim in itself. It is necessary to determine what the astronauts in the station would do there and why. The higher education and research minister believes that French space policy should be debated in parliament.

Germany: Transrapid Producers Confident of Keeping to Schedule

AU2104143594 Duesseldorf HANDELSBLATT in German 21 Apr 94 p 18

["gil"-signed report: "We Are Keeping the Transrapid Schedule"]

[Text] Hannover, 20 April—The board of directors of Thyssen AG in Dusseldorf are confident that the schedule for developing the Transrapid can be kept. Thyssen is the leader in the group of companies introducing this new technology, a field where German industry is still ahead of the Japanese competition, timewise. Speaking in Hannover, board director Heinz Kriwet welcomed the government's decision in favor of the Transrapid as the fifth means of transport. The Berlin to Hamburg route is scheduled to be opened in 2004.

Eckhard Rohkamm, board director of Thyssen AG in Essen, said that the composition of the planning company is being negotiated at the moment. It is to be funded jointly by the state and industry, at 50 percent each. He expects this to take four years. The central issues to be dealt with are the planning of the track and connections in the cities.

For this reason, it is important that Deutsche Bahn AG is involved in the company. This shows that there is no resistance there. "We do not want to cut any lanes through the cities, but the Transrapid is to be tied in with the existing transport infrastructure," Rohkamm pointed out. A best possible connection with ICE [Intercity Express] and the IC [Intercity] is necessary to make changing as easy as possible.

Rohkamm expects the Transrapid to be finally cleared for passenger transport in 1995. From mid-1994, permanent operation will be started on the test track in the Ems region. Thyssen wants to offer the public as many rides as possible in order to counter prejudices. "In addition, we will make the Ems region much more attractive by offering coffee trips at 420 kilometers per hour," the Thyssen manager said.

But this must not be seen as an alternative to the Berlin to Hamburg route. Rohkamm is confident that the act on introducing the Transrapid as an additional means of transport will achieve a majority in the Bundesrat. Rohkamm thinks that a reference track will continue to be necessary for exporting the Transrapid.

Experience in the producer country is psychologically important for making foreign governments buy the product. This was proven recently when Korea decided in favor of the French TGV [Tres Grande Vitesse] and against the German ICE. Rohkamm thinks there are good export opportunities in countries like the United States, Brazil, and in Asia; countries that do not have their own high-speed trains today.

Rohkamm expects 14.5 million passengers to use the Berlin to Hamburg Transrapid route in 2010, 40 percent of whom will change over from planes and cars. At 60 percent utilization, the Transrapid would reach profitability. The premises are the same as for a new ICE track that would be required by then.

CERN to Decide on Large Hadron Collider in June

94WS0332E Paris AFP SCIENCES in French 28 Apr 94 p 12

[Text] Geneva—The 19 member states of the European Particle Physics Laboratory (CERN) will officially decide in late June to build a new accelerator, the Large Hadron Collider (LHC), announced the management of the world's biggest particle physics laboratory.

The decisionmaking body of CERN, its council, met 15 April at the organization's management quarters in Geneva and adopted a resolution to that effect by a vote of 18 in favor and one abstention (Spain). The text of the resolution says the council is convinced of the scientific need for and economic value of the installation. Moreover, "aware of international interest in the project," CERN's council "would like physicists from non-member states to take part in the project" in exchange for a financial contribution.

Jean-Pierre Gourber, head of the accelerators technology division, told the French Press Agency that one state, Russia, had announced it would kick in 70 million Swiss francs (280 million French francs [Fr]). Discussions are also progressing nicely with Canada, Japan, the United States, and India.

The American Congress's decision late last year to axe construction in Texas of the SuperConducting SuperCollider (SSC)—a machine designed to perform the same kind of physics as the LHC, but even more powerfully—has intensified the interest of physicists the world over in the European project.

The giant proton/proton collider will be 10 times more powerful than the current Large Electron-Positron Collider (LEP) and will cost 2.23 billion Swiss francs (nearly Fr9 billion). This figure was advanced in December by the lab's director, Professor Christopher Llewellyn Smith (Great Britain), during the previous CERN council meeting to examine the project's final version (technical parameters and budget).

Although construction of the ring has now been budgeted, financing for the two detectors that will be added to it must still be determined. The detectors are where the accelerated particles will meet and where the products of their collisions will be studied.

The LHC will be installed above the LEP, in the underground ring 27 km in diameter that straddles the French-Swiss border. Construction is slated to begin next year, for completion in 2002. The collider is expected to enable physicists to push their "ultimate" knowledge of matter even further, by bringing to light new, theoretically-predicted particles such as the Higgs boson.

FRG Research Minister Seeks to Stimulate Inventions, Patents

94WS0329A Duesseldorf HANDELSBLATT in German 2 May 94 p 5

[Parties/Congress of the CDU [Christian Democratic Union]/CSU [Christian Social Union]-Association of Mid-Sized Companies]

[Text] Bonn - Research Minister Paul Krueger (CDU) wants to support inventors more than has been the case until now. The Ministry of Research and Technology is working on a "wide spectrum of starting points," Krueger said before the first Inventor Congress of the CDU/CSU (MIT) [Association of Mid-Sized Companies].

The possibilities for using scientific, technological information from data banks, for example, should be improved. The growing body of technical knowledge is making it increasingly difficult for the inventor to keep track of the state of technology. Many presumed new developments have already been passed by, so that "many billions" are lost through duplicated research and development.

Also, the initial and continued education of inventors at universities and technical colleges must be expanded. Inventor competitions and shows could also contribute to promoting innovations. Krueger wants to make "inventor offensives" possible in the nine [German] states and in business through such things as qualification seminars and the establishment of regional places for getting patents and inventors started.

In addition, an "appropriate scale of fees" for patent protection is necessary. Krueger called the increase in patent fees, which is currently being discussed, bad economic policy. The entrance price for patent protection has until now been deliberately kept low. The annual fees for keeping a patent in force would only become expensive when it demonstrated economic success. "This should also stay as it is." For independent inventors and medium sized companies, Krueger called for an additional 50% reduction in all fees demanded by the patent office.

The MIT chairman Klaus E. Bregger supported these demands. He proposed more risk programs, tax relief for inventors and a general lowering of the tax rate for undistributed profit of 30 to 35%. This is because around 70% of all patents are registered by medium sized companies or individual inventors who suffer from "their own weak capital cover." An increase in patent fees of 20%, as Minister for Economic Affairs Guenter Rexrodt (FDP) [Free Democratic Party] announced, "would be like taxing mothers' milk." In this regard, a speaker for the Ministry for Economic Affairs confirmed that Rexrodt in no way plans higher patent fees for individual inventors. This would be a "false signal" at this time.

The president of the German Patent Office Prof. Ernst Haeusser also turned against a "counterproductive increase in patent fees." Rather, following the tried and true American model, fees for independent inventors, medium sized companies and non-profit organizations should be cut in half immediately. At the same time, tax benefits must be reintroduced on income from the realization of protected inventions for independent and employed inventors and scientists. Also, the full functional capacity of the Patent Office should be secured, and funds and risk capital should be made available for obtaining patent protection.

FRG Research Minister Urges Tax Breaks for Research

94WS0329B Duesseldorf HANDELSBLATT in German 3 May 94 p 3

[Research/T[illegible]th the Research Minister—Tax Incentives Pro[illegible]pecially for Mid-Sized Companies]

[Text] Bonn - Research Minister Paul Krueger (CDU) [Christian Democratic Union] wants to give tax breaks for efforts made by companies in research and development (R&D). The question of financing is to be resolved in conjunction with additional reforms of business taxation planned by the federal government, Krueger explained in a talk with the Handelsblatt.

Although the concrete form of such a measure is still open, according to Krueger, he is personally proposing growth incentives which would stimulate additional expenditures in R&D, particularly by medium sized companies. New tax measures would have to concentrate mainly on benefits for current costs and, not least, on personal costs.

Krueger obtained new arguments for his proposals from an already presented study—"An International Comparison of Taxation of Research and Development in Business"—which was done by the University of Mannheim in cooperation with the Center for European Economic Research. According to Krueger [the study says], for example, that Germany is practically the only one among the major industrial countries which denies special tax support to research and development.

In Japan, the USA, France and Canada, as well as in many other leading industrial countries, the entire extent of tax benefits for research and development goes in part far beyond what is granted to German companies in the range of possible deductions. Krueger: "We have an authentic disadvantage based on location." Germany is poor in natural resources.

International Comparison of Incentives

The University of Mannheim study confirms that the academic opinion regarding the usefulness of tax encouragement is definitely positive. In the USA, Canada or Australia, where totally new analyses on this question have been presented, tax encouragement for research has led to companies actually using the additional money received from the [IRS and other] tax offices to increase their R&D expenditures. According to Krueger, there is no reason to assume that this would not also be the case in Germany.

In a poll regarding innovation in the Germany economy, all branches of industry and areas of technology complained about the lack of tax incentives as the central impediment to innovation. In view of the rated costs which are also very frequently inhibiting to innovation and risks from innovative products, broadly effective encouragement of R&D appears to be urgently needed, according to Krueger. He surmises that such a measure "would benefit at least 15,000 companies in Germany annually."

Such a "growth encouragement" would, according to Krueger, also have the important side effect of encouraging the creation of new jobs for researchers. In view of the increase in joblessness specifically among young researchers, which is a cause for concern, the importance of this side effect can hardly be overestimated.

Problems in Delimiting Taxable Events

Krueger calls problems in delimiting such a taxable event an important problem in connection with the implementation of R&D tax benefits. Difficulties like this surely occur for tax officers not only in conjunction with research and development but also with completely different tax-relevant tax events, according to Krueger. This is everyday life in tax offices. The problem also occurs in other countries, but nowhere has this been the cause of denying such a measure in taxation. Krueger: "I can scarcely imagine that German tax officers should accomplish less in this area than their colleagues in Japan or America, for example." Incidentally, it's possible to envision models in

which some of the burden would be taken off the finance authorities through consultation with appropriate experts on this problem of delimitation.

Krueger sees in tax breaks for research and development a supplement to current promotional measures of the Ministry of Research. Currently, as a rule support is given to very specific technologies such as in environmental protection or incentives are given to medium sized businesses for increased cooperation. This has the effect of a time-limited targeted incentive. The Research Minister urged that this should now be supplemented in a lasting and broadly effective way by an innovation-friendly organization of the tax system.

FRG Expert on Problems of State Research Institutes

94WS0351A Duesseldorf HANDELSBLATT in German 13/14 May 94 p 3

[Article by bbo: "Call for a Cooperative Model for Public Research Establishments"]

[Text] Duesseldorf—In a conversation with HANDELSBLATT the chairman of the Science Council, Professor Karl-Heinz Hoffmann, deplored the miserable financial situation of the public research institutions. At the same time he warned against cutting back basic research in favor of applied research.

"The innovative strength of our economy depends to a crucial extent on the capabilities of research and development in Germany," Hoffmann stressed. Cutting the budget for research would damage the competitiveness of the economy. "In our country research must—in social acceptance as well—once again acquire major priority."

Hoffmann sees deficits above all in the financial endowment of the academic institutions, which as the training places for the next scientific generation deserve a "special importance." The overloading at the academic institutions and the bureaucratic obstacles are almost hostile to research. The lack of flexibility in distributing resources and the overregimentation by committees and administration have created poor working conditions. The renewal of instruments in the laboratories and the practical training, which are now due according to the usual reinvestment cycles, have been delayed or eliminated through financial bottlenecks. The result is that research and training are carried out with obsolete equipment, he says.

In addition to better financial equipment, Hoffmann also sees the need for a structural reform in the academic institutions which is adjusted to research in modern fields of research. Today, interesting research takes place above all at the interfaces between the fields. But the academic institutions do not have any suitable structures for interdisciplinary or even multidisciplinary work.

At establishments outside the universities the situation is better than at the academic institutions. Here as well, however, the scarce funds have had an effect on the equipment, Hoffmann stressed. In addition, "the restraint of the industry regarding research contracts and employment of young scientists hinders cooperation and the transfer of knowledge to practical applications."

Hoffmann does not consider privatization of public research facilities to be the right way to achieve necessary structural improvements and greater efficiency. He calls for a gradual financial and administrative autonomy which would assure the necessary flexibility. Bringing in third-party funding is one element of competition among good research groups, which leads to a provable quality of research. Even so, there are research fields which because of the nature of their problems cannot attract very much third-party funding. For that reason sufficient basic government financing must be assured.

In this context Hoffmann turned against the still not conclusively finalized demand for taxing third-party research. With nothing but a "doubtful financial gain for the Federal Government" taxing could lead to "incalculable consequences." For example, at the academic institutions a fiscal administration would have to be established, research relevant for practical application would be affected and the transfer of know-how would in practice become more difficult.

Regarding the discussion about too little transfer of research results to practical applications, which, among other things, has given rise to the demand for strengthening application-oriented research relative to basic research, Hoffmann stated: Genuinely new and innovative products, which could be successful in the world markets, presume knowledge of the basics. In some fields German science is still the leading one. "If we gamble away this position, the danger exists that we will become an extended workbench among the major industrial nations." Potential efforts to influence the support for basic research must therefore be "decisively opposed."

But in fact Hoffmann rejects the distinction between basic research on the one hand and applied research on the other. Because it is precisely the lack of cooperation and the lack of mutual understanding by the scientists of both orientations which has resulted in too little transfer of knowledge and flow of information. "There is actually only good or bad research," Hoffmann explained, who advocates a "cooperative model" for the research fields. With this model the exchange of scientists and the utilization of modern communications technologies would acquire a crucial importance. Further, joint research including participation by industry must be strengthened.

FRG: Kohl, Industrial Leaders Comment on R&D Status, Problems

94P60250A Frankfurt/Main FRANKFURTER ALLGEMEINE in German 14 May 94 p 11

[Text] In the view of Chancellor Helmut Kohl, the German economy has lost ground in important areas of research. Some companies have deficits in high technology. But in the future Germany can stay present in world markets only if it has effective research, up-to-date products, and constant innovation. To a large extent Germany has become a

"country which is hostile, or at least skeptical toward technology," said Kohl at the initial meeting of an initiative by the German economy to improve the climate for innovation.

Chancellor Helmut Kohl and representatives from industry and science jointly demanded an "innovation offensive" in Germany. They urge the use of information and enlightenment to reduce people's fears of new technology. Kohl called for rethinking in society and cited the pioneering spirit of the 1950's. The job of informing people about technology must not be left to politicians. Parents too were urged to put an end to the "foolish hostility to science and technology which is found in many classrooms." Rethinking is necessary in the case of teacher training, Kohl said.

Kohl praised as a "great joint action" the nationwide campaign which was initiated by the DIHT (German Industrial and Trade Association) as well as the BDI (Federal Association of German Industry). From now until the fall, companies and research institutes will hold open houses under the motto "research you can touch." Lectures, discussions, and exhibits are to acquaint people with research topics.

DIHT president Hans Peter Stihl listed the following as examples of negative aspects of Germany as a location for research: fewer patent applications, the friction between basic research and applied research, obstacles in technology transfer, and the deficiencies in transforming research results into marketable products. "We are as quick to organize the people who hesitate and have objections as our competitors are to put new inventions on the world market." But high technology is vital for Germany, a high wage country, Stihl said.

As obstacles to the innovation offense, Stihl named high taxes, social expenses, and the jungle of laws, ordinances, and approval procedures. Stihl asked politicians for more efficiency in the use of subsidy resources and a combining of political authorities. One must not spend several times the amount of the research budget to maintain uncompetitive branches of industry, he said.

If the politicians and businessmen would be open to science, the scientists would seize the opportunity, said Joachim Treusch, chairman of the AGF (Working Association for Major Research Facilities). But he warned against limiting research to its technology relationship and against quality standards based only on utility. The differentiated German research system is admired and envied worldwide, he said. Several speakers cited the controversy over genetic technology as a negative example for how to handle a technology of the future. Kohl said it was "quite alarming" that there were 300 genetic technology production sites in the United States, 130 in Japan, and only 4 in Germany. In addition to changes in German law, further deregulation on the EU level was necessary, he said. Kohl said he had spoken with Jacques Delors, the President of the EU Commission, on an FRG initiative for the period of the German presidency in the second half of 1994.

CORPORATE ALLIANCES

France: Thomson-CSF, Bertin Conclude Fiber Optics Agreement

94WS0293C Paris AFP SCIENCES in French 24 Mar 94 p 45

[Article: "Thomson-CSF-Bertin Accord on Fiber Optic Sensors"]

[Text] Paris—The Thomson-CSF group and the Bertin company announced on 22 March the conclusion of an accord to pool their expertise in a very promising area—the fiber optic sensors already used in numerous domains in civilian and military sectors from nuclear technology to defense, aeronautics, oil exploration,etc.

Under the agreement, "which entails no financial transactions or capital stock linkages," according to Mr. Jean-Michel Barbier, director of technological cooperation at Thomson-CSF, "each side will have access to all the existing knowledge of the other," including patent portfolios, and in future a joint team at Aix-en-Provence will pursue research to improve the technology and pave the way for industrial spin-offs. Bertin will exploit civilian uses of systems that are developed, while Thomson-CSF will exploit military applications.

With this accord, Thomson-CSF, which is renowned worldwide for its achievements in optical electronics and optronics (at the Central Laboratory for Research or LCR), will benefit from research conducted by Bertin, while the latter will improve its position as leader in fiber optic sensors and gain access to LCR's complementary technological know-how.

Negotiated over a period of several months, the accord calls for creation of a coordination committee with a mandate to "enliven cooperation and find new applications" with the final goal, says Barbier, of cooperating and selling in a difficult economic period.

Mr. Jean-Michel Decaudin, operational director of Bertin's Aix-en-Provence center, says LCR will second six persons to the center, giving it a total of some twenty researchers in this one R&D domain.

First designed some fifteen years ago to meet military needs for data collection on underground nuclear tests and space telecommunications, fiber optic sensors permit high-precision measurement and high-speed (speed-of-light) transmission of the date gleaned, even where measurements are made in extreme environments (heat and very high pressure). They can also transmit a lengthy series of measurements thanks to their large bandwidth.

Taking advantage of low costs and miniaturization of lasers, diodes, and other equipment, these sensors are sure to find mass-market applications by the turn of the century in the automotive industry, aeronautics, and structural aging (roads, bridges, cooling towers).

The accord comes at a time when competition between Americans, Japanese, British, Germans, French, and Russians is intensifying...

Germany: Siemens, Italtel Set Up Joint Venture

BR2204084694 Bonn DIE WELT in German 28 Mar 94 p 12

[Text] German electrical giant Siemens has made a spectacular addition to its sensational list of holdings acquired in recent years. After failing the first time in 1989, Siemens has at the second attempt managed to join forces with Italtel S.p.A., Italy's largest telecommunications equipment manufacturer. This greatly strengthens the Siemens group's position in the already lucrative "Public Communications Networks" sector.

The breakthrough came Saturday after protracted negotiations. The agreement provides for Italy's state telecommunications holding company Stet [Telephone Finance Company], based in Rome, and Siemens to merge their subsidiaries Italtel and Siemens Telecomunicazioni into a new company in which the two partners will in future each hold 50 percent of the shares. Stet previously held 80 percent of Italtel shares. Twenty percent will continue to be in the hands of the U.S. AT&T group. This made Siemens' expected takeover of Italtel into a joint venture.

Both sides are still silent about the details. They say that the arrangements and formation timetable still have to be settled. Neither has anything been said about the price for Siemens entering the joint venture. The only thing that is clear is that Siemens will pay Stet a value adjustment because its own subsidiary, Telecomunicazioni, is very much smaller than Italtel. Stet belongs to the Italian state-owned IRI [Institute for the Reconstruction of Industry] group, in which additional privatizations are due this year.

The partnership contract provides that the Italtel board chairman will continue to be appointed by the Italian side alone. Siemens has also expressed willingness to leave Italtel's core business unchanged. This applies particularly to the construction and sale of telecommunications distribution equipment, one of the Milan manufacturer's main exports.

Neither partner is hiding its satisfaction about the agreement. It enables Siemens AG to run Italtel and its own Italian telecommunications subsidiary jointly, releasing synergies which previously had to be hidden. The agreement strengthens both firms' position, especially with regard to Alcatel and Ericsson, which also manufacture in Italy. Siemens is the biggest licensor Italtel has had since it was formed out of Siemens' former Italian branch, confiscated after the war. This decades-long association was probably what tipped the balance in the German partner's favor.

Italtel has a workforce of around 15,000. In 1993, group sales fell 11.4 percent as compared to the previous year to 2,632 billion lire (about 2.6 billion German marks [DM]), net profit 69.8 percent to 40.2 billion lire (DM40.2 million). The domestic market was primarily responsible for the collapse, with public sector demand for telecommunications systems and equipment falling by 31 percent. Even though exports more than doubled to 494 billion lire (DM494 million), up 110 percent, they were not enough to offset this decline.

This also affects earnings, since margins have to be particularly thin in foreign business. Italtel has a strong position in Russia, and the Italians now lead the Russian market for telephone exchanges. Foreign business is also expanding rapidly in Greece, Argentina and China.

France: Renault Automation, ABB Robotique Merger Analyzed

94WS0350B Paris L'USINE NOUVELLE in French 14 Apr 94 p 29

[Article by Daniel Chabbert: "ABB Robotique To Offer Turnkey Installations"]

[Text] *In planning to augment its already extensive product line, ABB Robotique is counting on Renault Automation (Acma)'s know-how, especially in the assembly of "body blanks."*

The acquisition of Renault Automation (Acma)'s robotics activities by world leader ABB Robotique, plans for which were announced toward the end of 1993, is to take place this month. Two companies are being created. The first, ABB Robotique SNC, will be set up in August on Acma's premises at Saint-Ouen-l'Aumone (Val-d'Oise), and will combine the robotics activities of the two firms. The second, Preciflex Systems, a 50/50 joint venture, will be based at the Beauchamp (Val-d'Oise) site, and will take over the "body blank" activities (vehicular body welding assembly lines).

Digesting the Specialized Engineering Know-How

While the first of these companies will be managed by ABB Robotique, the second is to be controlled by Renault Automation for two years. "But we expect to take definitive control of it at the end of that period," says Fabrice Dejoux, ABB Robotique's new general manager and former manager of ABB Service. This gradual transition will enable the Swiss-Swedish group to progressively digest the highly specialized engineering know-how.

This activity currently generates a revenue of 350 million francs[Fr], and is expected to grow in the future, particularly as regards exports, owing to the ABB group's presence in most of the countries of the world. "The absence of a commercial network abroad, with Renault Automation confining itself to spot sales directly from France, severely limited the development of this branch," says Fabrice Dejoux.

The international dimension of Renault Automation's know-how is attested to by the singling out of this French unit as the world center of excellence in the field of vehicular "body blanks." All of the infrastructures and the gray matter necessary for the development and realization of robotized production lines for the manufacture of assemblies for the automobile industry will thus be concentrated in a single location. The French subsidiary already possesses two other centers of excellence in the fields of industrial and commercial packaging, and will very soon have still another in the field of very-high-speed milling.

This line of turnkey solutions reflects the ABB group's new robotics marketing strategy, which is no longer aimed

simply at the sale of stripped-down robots, but rather of complete turnkey production-unit installations—robotized, of course! In France, for example, ABB Robotique derives 50 percent of its revenue from the sale of complete applications. It is an optimized approach designed to offer the client a customized installation suited to his needs, and to minimize the time of procedural implantation in the client's workshop. At Renault's Sandouville plant, ABB Robotique installed, in just one month, an automobile-body luting, grit-proofing, and blasting line that includes 14 robots.

Thus, in acquiring Acma, the Swedish group is more interested in Acma's robotized spot-welding know-how than in its robots catalog. "We have already set up a Franco-Swedish project team to develop future models of jumbo robots—Renault Automation's specialty—devoted to spot welding," says Fabrice Dejoux. "These robots will henceforth be manufactured in Sweden."

The Saint-Ouen-l'Aumone plant will continue manufacturing the current Acma line of robots and will take on a new activity. To date, each European subsidiary has overhauled its robots locally; now, this task, which is growing at a fast rate, will be centered in the Acma plant. "We have the necessary skills and production tools at that site to do this work," says Fabrice Dejoux. "Concentrating this activity insofar as concerns the European market will result in an appreciable economy of scale." In due time, ABB Robotique expects to be overhauling between 200 and 300 robots a year, as compared with some tens of robots in each country today.

The merging of Renault Automation and ABB robotics facilities will also result advantageous from the standpoint of maintenance service activities. ABB Robotique employs 50 maintenance service personnel for a total of 2,200 installed robots; Renault Automation, on the other hand, has available only 15 technicians to service 3,000 units. Until now, some clients have had to resort to maintenance services provided by independent companies.

[Box]:

The Two New Companies

ABB Robotique (French subsidiary), together with the Robotics Division of ABB Service, France will merge with Renault Automation's Robotics Activities to form ABB Robotique SNC, and with Renault Automation's Body and Sheet Metal Division to form Preciflex Systems, a 50/50 joint venture.

ABB Robotique SNC

ABB Service France's Robotics Division currently employs 130 full-time persons, 50 of whom are assigned to its maintenance service activity. The Division had a 1993 revenue of Fr175 million. It services 2,200 installed robots, and is based at Persen (Val-d'Oise). Its products: polyarticulated robots; turnkey robotized solutions.

Renault Automation's Robotics Activity employs 64 full-time persons, 15 of whom are assigned to its maintenance service activity. Its average annual revenue is around Fr170 million, with an installed total of 3,100 robots. It is based at Saint-Ouen-l'Aumone (Val-d'Oise), and its main products are 10-kg to 150-kg capacity polyarticulated robots, and applications.

The ABB Robotique SNC company resulting from the merger of these ABB and Renault units' activities will total 200 full-time employees, 85 of whom will be assigned to maintenance services. Its revenue, upon completion of the merger is expected to total between Fr300 and Fr350 million, with an installed total of 5,300 robots. It will be based at Saint-Ouen-l'Aumone (Val-d'Oise), and its products will be: polyarticulated robots, turnkey robotized solutions, and maintenance services.

Preciflex Systems

Renault Automation's Body and Sheet Metal Division employs 250 full-time persons. Its 1993 revenue totaled Fr282 million. It is based at Beauchamp (Val-d'Oise), and its main products are: "body blank" assembly lines.

Preciflex Systems, the 50/50 joint venture that will result from the merger of this unit's management and activities with the remaining ones of the ABB Robotique/ABB Service France's Robotics Division group, will employ 270 full-time persons, and is expected to post a 1994 revenue of Fr380 million. It will be based at Beauchamp (Val-d'Oise), and its products will be: "body blank" assembly lines.

France's Schneider, Germany's AEG Merge Automation Divisions

94WS0350D Paris L'USINE NOUVELLE in French 28 Apr 94 pp 58, 59

[Article by Olivier Lauvige: "Schneider Speeds Up Its Run for the Leadership"]

[Text] *France's Schneider has allied itself with Germany's AEG in the programmable automatons area just a few days before materialization of the linkup between Telemecanique and Merlin Gerin.*

On Sunday 16 April at 11 p.m., Schneider's chief executive officer, Didier Pineau-Valencienne, took a deep breath. He had just signed the agreement to merge his group's programmable automatons activity with that of Germany's AEG, thus laying the indispensable final cornerstone of the multinational enterprise he had been edifying for the past ten years or so.

The wedding plan, however, had come very close to falling through. German aeronautical and automotive builder Daimler-Benz hesitated to let a subsidiary as strategically important to its activity as AEG distance itself from the fold. It became necessary to provide reassurances and to balance the capital contributions of each.

Each of the two partners will hold a 50-percent stake in the new company, AEG Schneider Automation, which will occupy second place worldwide alongside Allen Bradley, but behind Siemens. "We just happened to be truly made for each other," exulted Didier Pineau-Valencienne. Indeed, the two companies' programmable automation activities generate approximately identical revenues—1.5 billion francs[Fr] annually—and employ the same number of persons: 1,100 employees each.

Management responsibilities will also be shared. The chairman of the board of directors, Daniel Melin, of Schneider, will be based in Paris in the group's new offices at Boulogne, but the management of operations will be headed by Paul White of AEG from his office in Frankfurt.

But why should the CEO of a group with a revenue of Fr5[illegible] billion and 91,500 employees feel so jubilant over the creation of a company that, after all, can be expected to generate a revenue of not more than Fr3 billion?

Geographic and Technological Complementarity

"We consider the API [industrial programmable automatons] activity to be an essential one for the future," says Didier Pineau-Valencienne. "In addition, this operation enables us to speed up the globalizing of our specialties, and the approach to our goal of becoming the world leader in each of our specialties."

An international client wants to deal with a supplier of international rank. Example? A major American car manufacturer is going to reduce the number of its current suppliers of automation equipment from nine to three. Each must be of world size. In the absence of an alliance, neither Telemecanique nor April nor AEG could have qualified to bid.

Another reason evoked is the number of installed machines. "We are entering a service phase," says the Schneider group's CEO. "I am no longer selling an automaton. I am guaranteeing an automation system that must work. Hence, I maintain it. The future is the sale of such services."

But the aim of the merger of the two groups' programmable automaton activities is not confined to attainment of a critical size. The geographic and technical complementarity of the wedding pair has endowed the new couple with a number of other advantages.

First of all, commercial advantages. For many years, Schneider has been spending fortunes to sell its products across the Rhine. This alliance now opens to Schneider, at no cost to it, the doors of the gigantic German market (three time the size of the French). It also facilitates the entry of Telemecanique products into China and Korea, where AEG has 25 percent and 50 percent of those markets respectively.

In the United States, it is the two companies' technological complementarity that will serve the group's hegemonic aims. There, as a result of its acquisition of Square D in 1991 by way of a public tender, Schneider already has a very good distribution network, and now, with the Modicon product lines provided by the Germans, it will be able to play the card, across the Atlantic, of a process regulation and control specialist. This merger will yield a harmonization of production sites, with, in due time, one plant in France, one in the United States, and one in Germany, says Ernst Georg Stockl, chairman of the AEG board of directors. How many jobs will thus be sacrificed and when? No one ventures a reply to this question today. But the Schneider group is counting on repeating the strategy it adopted for the merger of Telemecanique and Merlin Gerin: time and tact.

Following the patient readying that ensued after Schneider acquired Telemecanique via a stormy public tender, the activities of the two subsidiaries will be combined, on 3 May, under a single corporation called Schneider Electric. And even though, in this case as well, the activities of the two enterprises were characterized by a high degree of mutual complementarity—with Merlin Gerin specializing in electrical distribution, and Telemecanique in industrial control—it took all of two years to finally give birth to a joint organization. This was the time it took for the two companies, each characterized by its own very strong enterprise culture, to accustom themselves to the change. In the conduct of this joint organization, the social partners [unions and management] are to be linked by a process of negotiation that began last December. The current collective benefits of each of the companies are guaranteed to their personnel, by law, for a maximum duration of 15 months. If the negotiations are successful, the resulting collective benefits will replace the current ones. If not? The parent management will mediate.

This merger has also resulted in a restructuring into divisions of almost identical sizes and annual revenues, according to domains of strategic activity [DAS]. Thus, Telemecanique's three former DAS's and Merlin Gerin's former five have engendered only four in the Schneider Electric group. The programmable automatons division of Schneider's factory automation DAS has been combined with that of AEG. And the speed-variations and numerical-controls divisions have been combined with Schneider Electric's components and industrial controls DAS (see chart [not reproduced]).

As of today, the Schneider group's neat-looking organization chart, on paper, satisfies Didier Pineau-Valencienne's aims. Remaining to be seen is its actual implementation and the resolving of the numerous social problems and cultural shocks that will stem from this new international organization.

Respective Contributions

	Schneider	AEG
Capital (billions of francs)	1,500	1,500
Number of persons	1,100	1,100
R&D budget (millions of francs)	250	250
Production units	3 in France; 1 in U. S. (Square D)	1 in U. S. (Modicon); 1 in Germany
Distribution network	Wholesale	Integrated
Strengths	Worldwide supplying of electrical equipment; good distribution network in U. S.	Well established in Germany; good regulating products; systems engineering approach

Schneider Group in 1993

	Revenue (billions of francs);	World Rank (estimate)
Industrial Branch		
Electrical Distribution (Merlin Gerin, Square D)		
Very high voltage	3.4	3rd
Medium voltage	5.3	1st
Low voltage	11.4	1st
Systems, assemblies, services	6	Undetermined
Thyratron inverters	2	1st
Industrial Control (Telemecanique, Square D)		
Automation	2.6	5th
Industrial control components	7.2	1st
Business Branch (Spie-Batignolles)		
General Business	7.9	
Electrical Installation	10	

Schneider generates annual revenue totaling Fr56 billion. It employs 91,500 persons.

CORPORATE STRATEGIES

France: Government Debates Renault Privatization

94P60166A Paris LE MONDE in French 7 Mar 94 p13

[Renault's Privatization Date the Subject of Government Controversy]

[Text] Will Renault be privatized in 1994? The question is the subject of an ongoing Government debate, that could bring about a resolution during the next interministerial council's session. If the principle of privatization itself is no longer questioned by anybody, nevertheless, the opinions with respect to placing this symbolic firm on the market before the presidential election in May 1995 remain divided.

In the camp of those "for" (privatization) are the ministers of the economy and industry, Edmond Alphandery and Gerard Longuet. According to them, the automotive firm must gain very soon the status of a private enterprise to increase its maneuvering room and ability, particularly if it wishes to get rapidly into (new) alliances. Renault's status has in fact been among the reasons for its failure to merge with Volvo. They wouldn't like to see the experience repeated. The national enterprise's management is also in favor of a quicker privatization, since the structural obstacles to this have been removed by the denouncement of the agreement with Volvo.

No names have been officially mentioned in the camp of those "against" (privatization), however, rumors have it that in the office of Charles Pasqua, the interior minister, they fear the political and social backlash that might be provoked by the privatization of this company, a symbol of workers' struggle. Others are advancing more technical arguments. Presently, the automobile industry is in the midst of crisis. Perhaps it would be better to wait for the confirmation of a recovery before placing Renault on the market. Beyond this, the stock market's frailty also encourages caution. The "air pocket" recorded in the Paris market at week's end is a further proof of this.

According to the prime minister's circle, the decision is even harder to take since it is "budgetarily not indispensable." The privatizations already announced for the year will be sufficient to ensure the 55 billion francs of receipts provided in the State's 1994 budget.

France: Renault Privatization Rejected

94P60166B Paris LE MONDE 10 Mar 94 p 15

[Text] Ultimately, political considerations will have outweighed economic ones. By removing Renault from the list of companies to be privatized next, the Government made the report on privatizing the automotive company official at the presidential level. The fear of social unrest occurring inside the company induced the Government to caution. Before the presidential elections, the Government wants to avoid the risk of having to retreat in the last minute, if the CGT (General Labor Confederation) should succeed in mobilizing its troups against privatization.

The reasoning was implacable: a successful privatization would not bring in one additional vote; then why take the risk, even if extremely small, especially, when in the short term, the Renault privatization will not permit the creation of one single additional employee? The people inside the company know that these risks are minimal. "This is not a subject for people to go striking over it." This feeling is also being shared by the ministers of industry and economy. However, the strategic advantages that favor a rapid privatization do not carry enough weight.

Uncertainty About the Future.

By remaining publicly owned, the company is less maneuverable and slower in noticing alliance opportunities. The failure of the merger with Volvo has amply demonstrated this. Beyond this, the company's daily evolution is fogged by feelings of uncertainty about the future. Instead of concentrating on its true mission—manufacturing automobiles—for many months Renault will continue to be confronted by the structure of its future shareholder base, but also by its management's stability. With Louis Schweitzer, formerly Laurent Fabius' cabinet director during the latter's reign as prime minister, the rumors may only intensify. This issue should be resolved on 22 May, the date when the CEO's mandate expires.

This report came also at a time when on the Paris Stock Market the automobile stocks seem to be frozen. Peugeot's issuing convertible bonds valuing close to 4 billion francs, whose non-converted gross yield had been 5 percent, was oversubscribed 8 times over in the few hours on Monday-to-Tuesday night 8 of March.

Germany: DASA Losses Continue

94WS0280A Duesseldorf WIRTSCHAFTSWOCHE in German 11 Mar 94 pp 48-50

[Article by Friederike Meier: "Costly Aerial Odyssey"]

[Excerpts] Six years after its establishment, the Daimler subsidiary has posted an operational loss in excess of DM800 million. Deutsche Aerospace AG's [DASA] costly aerial odyssey can no longer be disregarded:

Dornier: With its rich history, DASA's aerospace subsidiary had already surpassed 1992's hefty loss of DM237 million in the first nine months of 1993. By October alone the loss amounted to DM266 million. Factory committee member Oscar Pauli remarks: "Dornier's balance sheet is flashing bright red."

Engine and Turbine Union [MTU]: Even the drive unit manufacturer keeps sinking deeper and deeper into the red. In the first nine months of 1993, MTU, with its DM142 million, had practically caught up with the loss for all of the previous year (DM148 million). There will only be an uptick if the economic situation of the aircraft construction industry gets off the ground once more. Analysts do not anticipate that before 1996. It will go even worse for MTU this year if, as Daimler corporate strategy intends, the diesel engine branch (54 million in earnings as of 30 September 1993) is turned over to corporate subsidiary AEG. In the words of an MTU employee: "That will make it really bad for DASA."

Temic: First set up in mid-1992 from elements of AEG and DASA, this micro-electronics subsidiary lost DM38 million in the first six months of its existence. In 1993 it continued its downward trend. In the words of one factory committee member of the Heilbronn firm: "We are not producing any earnings, but we are in a pretty good position vis-a-vis AEG." For Schrempp the advantage is that in 1994 Temic will go over to AEG.

Eurocopter: The French-German helicopter joint venture, in which DASA has approximately a 30 percent share, is struggling with declining orders. Following meager earnings of DM7.4 million in 1992, the French partners expect a loss of at least DM90 million for last year.

Fokker: In 1993, the Dutch aircraft manufacturer was retroactively consolidated into DASA's balance sheet, with an estimated loss of DM150 million. At present 1,900 jobs out of approximately 10,000 have been eliminated. Still, by itself that will not be enough. Andre Mulder, an aviation analyst with Barclays Bank in Amsterdam predicts: "The banks will soon call DASA's attention to Fokker's weak corporate capital quota. The Germans will then no longer escape an injection of capital." Mulder even already knows where Schrempp, who had Fokker cost him DM800 million, will probably get the money: "He will probably have to knock at Daimler-Benz's door."

In Stuttgart, [Juergen] Schrempp will appear foremost as a supplicant instead of the brilliant successor of Daimler boss Edzard Reuter. In this capacity he might even become a regular at corporate headquarters if the scenario of its aviation director, Hartmut Mehdorn, becomes a reality. Last week he announced that the savings measures proclaimed in the fall (elimination of 10,000 jobs, closing of six sites) will only be sufficient "if the European fighter aircraft is built, if the remaining development divisions are engaged in the Future Large Aircraft project and if we are able to build 120-130 Airbuses over the year." According to Mehdorn: "Otherwise we will keep having problems."

For Schrempp to have a soft landing in the boss's chair in Stuttgart next year there are perhaps three reservations too many:

Last year, the European Airbus consortium, in which DASA holds a 37.9 percent share, flew into a stagnant economy. In 1992, Airbus still polished off DASA's balance sheet with a DM650 million profit. But in 1993 the number of new orders dropped from 136 to 38. Airbus was forced to correct downwards by 35 percent production

planning for 1994 to 1997. For DASA the result was a DM3 billion loss in turnover. Nor, for the time being, is it of much help that Daimler boss Reuter will assume chairmanship of the Airbus industry board of directors beginning in April (see WIRTSCHAFTSWOCHE 10.1994).

The fate of the European fighter aircraft, the Eurofighter 2000, the pared down follow-on version of 1990 fighter aircraft, is absolutely uncertain. An additional 8,000-10,000 DASA jobs depend on the costly bomber (unit price: a minimum of DM130 million).

Nor in election year 1994 is there likely to be any decision made on the Future Large Aircraft, the successor to the Transall military transport for which Schrempp is seeking from the government DM25 million per year in development assistance, loan surety and procurement guarantees.

No question but that Reuter and Schrempp were caught cold by the easing of political tension in Europe. The government's defense budget over the past four years shrank by nearly 60 percent. It was a disaster for Germany's largest armaments firm. Although for years Schrempp had been announcing the reduction of the armaments share in DASA's turnover, in 1992 it still continued to total 37 percent. And company spokesman Hubert Horn admits: "Because civilian business is doing poorly, the ratio is going more in the other direction."

Schrempp is also getting his comeuppance for the craving for status of past years. He used to like to proclaim: "I am not interested in business areas with less than DM1 billion in turnover." He was betting on large projects like the Hermes space glider or the Columbus space station. As a result, when the brief dream of European manned space flight fell through, DASA lost millions and missed its chance at commercial space travel. DASA's Romantis satellite project is in its infancy and the Daimler subsidiary only has a 10 percent share as equipment supplier in the European booster rocket Arianespace.

Even in the German-French joint venture Eurocopter, DASA was forced to yield technology leadership to the Aerospatiale partner. The same risk is now facing the guided weapons branch that is supposed to be incorporated this year into a joint enterprise on the Eurocopter model.

As one Dormier factory committee member states: "We are able to develop high technology but we are not able to sell it." Not even to their own subsidiaries. Fokker's regional aircraft are flying with drive units from BMW/Rolls-Royce, MTU's competitor.

French Government Said Ready To Sell Bull to NEC

94WS0285A Paris L'USINE NOUVELLE in French 17 Mar 94 p 30

[Article by Dominique Commiot: "State Ready To Cede Control of Bull to NEC"]

[Text] No date has been set for Bull's privatization. But time is pressing, and prospective minority shareholders are not beating down the doors. So the government reportedly is prepared to transfer a majority interest to NEC, if the Japanese firm wants to acquire it.

Jean-Marie Descarpentries, president of Bull, will be traveling soon to Armonk, to the U.S. headquarters of IBM. He is reviving some marketing ventures with Hewlett Packard and making contacts with Olivetti. But the most likely candidate to take over Bull is still NEC. Industry Minister Gerard Longuet met in Tokyo with its directors on 11 March, 3 days after publication of the decree announcing Bull's impending privatization. "They were not given a proposal with specific numbers," explains Thierry Breton, director of strategy at Bull, who attended the lunch. As Longuet was leaving, however, he indicated that a Bull takeover by NEC was not out of the question.

For the world's third largest computer products builder [i.e. NEC], Bull is a strategic partner. Mainly because it provides the French manufacturer with its biggest computers. Bull's installed plant constitutes for NEC not only a precious commercial bridgehead outside Japan but also a captive market. Even though revenue from mainframes is declining by 15 percent per year, it still accounts for half of Bull's turnover. And combined with income from maintaining that plant, it nets 3.5 billion French francs [Fr] per year in profits, while all other activities combined are producing a Fr 7 billion loss.

This source of profit will not dry up anytime soon. The movement of clientele to open systems will take a long time, and migration of information systems to the new architectures holds out promise of goodly earnings on the services side.

Moreover, during their 10 years of partnership, the teams of the two builders have gotten to know and respect each other. Despite the chronic problems of the French group, NEC didn't wait to be asked twice when it got the opportunity to exchange its interest in Bull NH for a 4.7 percent participation in Compagnie des Machines Bull in November 1991. And in late 1993 it agreed to contribute Fr400 million to the latest recapitalization. In exchange, NEC obtained a strengthening of its accords on hardware and software development for big systems and deliveries to Bull of memory circuits and flat screens for portable microcomputers.

NEC thus would seem to have little to gain by increasing its participation from 10 to 20 percent and sitting shoulder to shoulder with other manufacturer shareholders... unless this is only the first step toward a takeover. Reportedly, the Japanese firm would be given a free hand to restructure Bull and transfer nonstrategic activities.

Acquiring a majority interest in Bull would not be terribly costly. After the December 1993 augmentation, its market capitalization stands at Fr13 billion. The transfer price will probably be even less, given Bull's losses (about Fr5 billion in 1993) and indebtedness (Fr4.4 billion as of January). The government needs to wrap up the deal quickly. Because France's enormous public endowments to Bull and Air France, requiring Brussels' approval, are exciting increasingly strong opposition from the competition. And Bull's internal problems continue to mount.

Many Departures

After the 1993 books are finally closed—the date has slipped from 3 March to 16 March—Jacques Lebhar, executive vice president in charge of financing, will quit Bull. The loss of this key intermediary with Treasury is taken as a bad sign in the financial community, notably at BNP [National Bank of Paris], which heads Bull's bank consortium and is one of its biggest clients. The resignation of Pierre Lombardy, head of the "finance and services" commercial network in France, has raised more questions about Bull in banking and insurance circles. And with the departure of Jacques Pantin, former director of strategic marketing, Bull is losing one of its interfaces with NEC.

Bull's ownership is presently divided as follows: French state, 75.8 percent; France Telecom, 17 percent; NEC, 4.4 percent; IBM, 2.1 percent; and public shares, 0.7 percent.

ICL-Fujitsu Marriage

When Fujitsu, the world's second largest computer products builder, acquired 80 percent of ICL in 1990, the British manufacturer was already turning a profit. Since then, it has continued to be one of the few big companies in the sector still operating in the black. Its turnover increased 6 percent in 1993, to Fr23.6 billion. An enviable performance, though net profits were only Fr5.4 million, compared with Fr236 million in 1992.

France: SGS-Thomson Set To Open New Plant in Europe

BR0604104194 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 24 Mar 94 p 8

[Report signed "F.G.": "A Second 0.5-Micrometer Plant in Europe?"]

[Text] In 1994, SGS-Thomson estimates that its microcontroller sales will increase by more than 60 percent, while sales of its specific circuits will be up 70 percent (mixed and analog specific circuits could thus generate turnover of $100 million this year, as opposed to $4 million in 1993). These key activities of the programmable products division each represent annual sales worth more than $150 million. This division is also responsible for transputers. Currently, the French-Italian company's main concern is how to increase its production capacity to meet demand. Philippe Geyres, vice president of SGS-Thomson and in charge of the programmable products division, states: "We could deliver twice as many specific circuits if we had the production capacity." Where SGS-Thomson plants are not full to overflowing they are completely saturated (in other words, there is no free space to install new equipment). For example, after switching to 0.8-micrometer technology (from mostly 1.5-micrometer technology in 1993), the company's Rousset plant, which produces microcontrollers, is currently approaching saturation point.

Production Could Start in 1996

The French-Italian company is thus today faced with a major decision concerning the establishment of a new production unit using 200 mm-diameter wafers and 0.5 micrometer technology (similar, therefore, to the Crolles plant). The final decision has yet to be taken, but this module, which could be operational in 1996, should be located in Europe, either in France (the Rousset and Crolles sites appear to be the best placed), in Italy, or in another European country making the company a good offer in terms of conditions. However, apart from the current problem of the lack of production capacity, Philippe Geyres states: "We can and must start up a major new production module every 18 months to two years, irrespective of the state of the market."

Transputer Finally Hits Mass Production

The switch to a 0.7-micrometer technology on 200 mm-diameter wafers seems to have solved all the problems that were blocking the production of the T9000 transputer, which was first introduced over a year ago. SGS-Thomson's key microprocessor is now being produced at Crolles in sufficient quantities to meet demand (the French-Italian company plans on producing between 20,000 and 40,000 in the second quarter). According to Philippe Greyres: "Despite the fact that we are lagging behind the initial schedule, the T9000 remains on a par with today's best products in terms of calculating power, while the possibilities it opens up in communications make it unique in its category." Of course, it is not aimed at the same market as the Intel and Motorola microprocessors (a market which SGS-Thomson may yet decide to enter), but it is finding a niche with a number of applications, and in particular video servers for interactive digital TV. If we are to believe Bob Krysiak, director of the transputer development group based in Bristol, England, in 1993 the transputer ranked second behind AMD's 29000 for 32-bit microprocessors used in applications other than PC's and workstations.

France: Ways of Privatizing Thomson SA Discussed

94WS0284A Paris LE MONDE in French 24 Mar 94 p 20

[Text] TCE ["Thomson Consumer Electronics] Operates in the Black Again; Thomson's New 'Tinker Toy'"—first paragraph is LE MONDE introduction]

Over one month ago, Thomson's new CEO [chief executive officer], Alain Gomez, gave to the minister of industry the report on the privatization of the electronics group that the government had asked him to prepare. Although ordered by law, the privatization will not take place in the immediate future; however, the appreciable recovery of the TCE consumer electronics subsidiary now makes it much less problematic.

It is now over one month since Alain Gomez, the Thomson CEO, handed over the report that the minister of industry and foreign trade, Gerard Longuet, had asked him to prepare in July 1993. The minister asked him "how to merge CSF [General Radio Company] and TCE," the group's two major subsidiaries. Actually, what is involved is not strictly speaking an alliance, but a reconfiguration of the Thomson SA group and its two subsidiaries: Thomson-CSF, the well-endowed military branch, and Thomson Consumer Electronics (TCE), the penniless "television set" activity. In spite of its interest in Credit Lyonnais—a

cause of much difficulties—the former has a rich cash flow and, mostly, a large borrowing capacity; the latter, for its part, is still burdened with debt in excess of 10 billion francs [Fr].

Now, the state-owned group owns 100 percent of TCE, but only 60 percent of the military branch, the remainder being traded on the stock exchange. This lopsided situation raises many questions. How can Thomson SA be privatized when the group as a whole is less attractive than its one subsidiary listed on the stock exchange? How can the imbalance between the subsidiaries be remedied without despoiling CSF minority shareholders?

Thomson SA-CSF Merger

"To consider, even for a moment, a merger or an alliance between CSF and TCE did not make sense," someone familiar with the case observed. The reasoning underlying the operation considered is quite different, sources close to the government confirmed: the objective is a merger of Thomson SA and its military subsidiary, the new group retaining 100-percent ownership of TCE. The operation is complex, since CSF minority shareholders will have to be persuaded to exchange their shares for shares in the new entity. But it will offer many benefits; for instance, it will make it possible to use the CSF cash flow to help the recapitalization of TCE.

Balancing the accounts of the consumer electronics subsidiary was a prerequisite to making the operation credible. It is now on the right track. After declining for four years (Fr36 billion in 1989; Fr30.5 billion in 1992), TCE sales finally recovered last year (Fr33.48 billion). The operating result is positive again: Fr155 million (in 1992 it was -Fr335 million). But even though it was reduced by half, the net loss, resulting from carrying charges (Fr1.01 billion), still amounted to Fr973 million.

"Let's not complain," exclaimed TCE's CEO Alain Prestat, while acknowledging that the group's recovery is more advanced in the United States than in Europe and that the rise of the dollar (somewhat) helped improve the balance sheet. In America, where the group sold 4.5 million television sets in 1993 (compared with only 3 million in Europe), TCE has won back TV-set market shares, especially with high-end sets.

"In Europe, on a market that is declining both in volume and in value, TCE is regaining TV-set and video-recorder market shares for the first time in eight years," the company also pointed out. This time, however, the recovery came at a high price, or rather it involved slashing the prices of some of the group's brands. "When you are lucky enough to own several brands, you can make use of it," Mr. Prestat acknowledged. "For years, everything was geared to high-margin products. We cannot remain in the third or fourth place worldwide if we are not represented in the low-end and intermediate ranges. I, too, know how to sell to Auchan, Conforama, and Carrefour [retail chains]." From now on, TCE is also fighting at the "low end."

Although real, TCE's recovery nevertheless required an austerity cure. Personnel (50,000 employees) was reduced by 10 percent, and the salaries of European executives were frozen for two years (1993 and 1994). The gain, however, must be consolidated if the "tinker toy" devised by Alain Gomez is to become a reality.

Unless of course the Thomson CEO uses another trump card. Asked to contribute to the recapitalization of Credit Lyonnais, he might demand in exchange a little help for his "tinker toy."

Edzard Reuter Appointed New Airbus Industrie Chief

BR0905102594 Paris LA LETTRE DU GIFAS in English 31 Mar 94 p 1

["Edzard Reuter, Chairman of the Airbus Industrie"]

[Text] Edzard Reuter, Chairman of the Daimler-Benz AG Directorate was unanimously voted Chairman of the Airbus Industrie Supervisory Board by the four aeronautical manufacturers making up Airbus Industrie. Mr. Reuter succeeds Dr. Hans Friderichs, former minister of the German Federal Republic. Louis Gallois, who was reelected Vice President of the Airbus Industrie Supervisory Board, speaking on behalf the partners, declared: "We are all pleased that the former chairman himself proposed the name of Edzard Reuter, which is understandable as Mr. Reuter, a leading European industrial figure is known worldwide for his talent in strategic management." By personally assuming responsibility for the future of Airbus Industrie, Mr. Reuter tacitly underlines his conviction that the aeronautical industry, now as in the future, will always remain an essential element in the economic growth of Europe.

Germany: BMW Confident in its Relations with Honda

94P60186A Paris LE MONDE in French 31 Mar 94 p 22

[Text] On 29 March, BMW CEO Bernd Pischetsrieder had two reasons to feel happy and confident during his (company's) annual performance conference held in Munich. First, BMW's business turnover in the first trimester of 1994 rose to 7.5 billion German marks [DM] (25.5 billion French francs [Fr]), that is a 2.7-percent increase. Enough to let these good results reflect on the total (business) exercise. In 1993, with a 7.1 percent lower business turnover, down DM29 billion, the Bavarian manufacturer, in fact, still finished the year with a net result of DM516 million. In France, BMW managed a net Fr230-million profit, second best in its history.

Secondly, Mr. Pischetsrieder is more convinced than ever about the correctness of acquiring Rover. According to BMW's financial director, Volker Doppelfeld, "In the medium and long term Rover is more interesting and better placed than it was believed." And, in the words of the Munich-based firm's CEO, "The technological cooperation between Rover and Honda with the 200, 400 and 600 (Rover models) will continue because this serves both partners' interests." And anyway, as the rumors behind the stages go, if Honda will not follow suit, (for BMW) it will be not too difficult to find other suppliers, especially for the Rover engines under Honda license.

For the 800 (model), Rover's top of the line, which has to be redesigned next, it seems that BMW will opt to replace the (traction) front wheel for a (propulsion) rear wheel drive solution—the German firm's specialty—in other words, for this model Rover will regain its independence from Honda.

Synergisms between Rover and BMW will be developed prudently. The Renault and Volvo (failed merger's) unfortunate example is still fresh in memory. If the two firms count on realizing significant savings, particularly with procurements, the creation of a common buying center is not a question.

Financially, Rover ought to turn out a profit on production in 1994; but a firm could still contribute negatively to the group's consolidated results by employing different accounting methods.

In order to increase its maneuvering leverage, BMW will proceed to an DM82-million capital augmentation.

France: SNECMA 1993 Figures Reviewed

BR0905124394 Paris LA LETTRE DU GIFAS 7 Apr 94 in English p 1

["SNECMA: Improved Situation and Preparing for the Future"]

[Text] The SNECMA [National Company for Aircraft Engine Studies and Construction] Board of Administration met on 1 April and closed accounts for fiscal year 1993. Operational results showed 273 MF [million French francs] in 1993 against 103 MF the preceding year, a gain of 170 MF. The profit situation also improved from minus 166 MF in 1992 to minus 40 MF in 1993. The 1992 negative shortfall of 63 MF improved by nearly 300 MF in 1993 reaching plus 234 MF. These figures are particularly noteworthy because they were obtained in spite of a drop of around 20 percent in revenue, which fell from 13,538 MF in 1992 to 10,851 in 1993 and in spite of the fact that 22 percent of turnover was invested in the preparation of new products. The restructuring efforts applied since 1991 are now starting to pay off.

This action will be continued and expanded in 1994 to offset a new drop in revenue that could be below the 10,000 MF point. the cost for financing these adaptation measures for SNECMA and Group member firms was a major cause for the exceptional worsening of profits, which fell from minus 570 MF in 1992 to minus 995 MF in 1993. After tax credits, net profits for SNECMA stood at a negative minus 692 MF against a negative minus 593 MF in 1992. net indebtedness was reduced from 2,556 MF by the end of 1992 to 1,120 MF by the end of 1993. This was obtained largely through cycle reduction in production and R&D.

Final net consolidated profits for the Group were minus 804 MF (against minus 794 MF in 1992). This figure reflects losses in the fiscal period caused by the rapid revenue contraction from 22,838 MF to 19,566 MF, a loss of 14 percent. Consolidated operating results grew to 496 MF (118 MF in 1992), a gain of 378 MF. The gradually increasing contribution of affiliates is expected to be more apparent in 1994. In spite of indebtedness and financial charges that are still very high, the group has swung back to balanced books, posting profits of plus 48 MF against losses of 510 MF in 1992.

Germany: Optimistic Siemens Set To Double Semiconductor Capacity

BR2804141394 Paris ELECTRONIQUE INTERNATIONAL HEBDO in French 14 Apr 94 p8

[Elisabeth Feder report: "Siemens to Double Semiconductor Production Capacity"]

[Text] Munich—Half way through the Siemens financial year (which closes on 30 September), Juergen Knorr, manager of the German group's semiconductor division, considers it is on course to achieve the aims he set: losses of less than 100 million German marks [DM] for the year (after losses of DM165 million for 1992-93); financial equilibrium in 1994-95; and initial profits starting in 1995-96. The last two targets will have to be achieved despite major investments set at about DM500 million per year for the next two years, especially for the construction of the production plant in Dresden. However, the current climate in the field of semiconductors should help Siemens in this effort. According to Juergen Knorr, the world semiconductors market should grow this year at the same rate as last year, i.e. at over 20 percent. Siemens, however, is more ambitious, banking on progress of 25 percent (DM2.6 billion) of its semiconductor division's revenues for 1993-94. Knorr is then counting on average growth of 15 percent per year to achieve revenues of DM4.8 billion for the financial year 1996-97. By comparison, the division's annual turnover since 1989 averages out at just 10 percent. We should also add that less than 20-percent of its sales are made inside the group.

A particular feature of the process of divisional restructuring started two years ago is the rationalization of production, each plant being dedicated to a specific technology: 1.2 micrometer or larger technology is handled in Villach (Austria), 0.7 micrometer in Ratisbonne (Germany), and 0.5 and 0.4 micrometer in Corbeil-Essonnes (France), in association with IBM. The future Dresden site, the construction of which is to begin in the summer, will specialize in 0.35 micrometer and smaller technologies. Assembly and testing of all products will be done in Southeast Asia (Penang and Malacca in Malaysia, and Singapore). Moreover, Siemens also envisages investing to extend one of its existing German or Austrian sites, but the final decision has yet to be taken. By 1997, the company wants to have a production capacity equal to DM4 billion in turnover compared with the current figure of DM2.2 billion. In order to meet its requirements, Siemens is therefore obliged to turn to subcontractors—after all, this year it is aiming to generate DM2.6 billion with a production capacity of just DM2.2 billion. Juergen Knorr moreover confirmed that he already outsourced a share of production, in particular integrated circuits for industrial applications, to Taiwan-based TSMC.

The divisional restructuring process also involves recentering the product catalogue on the strongest applications sectors, and telecoms in particular. Certain nonprofitable

product lines, including in the industrial sector, have therefore been dropped. In the sector of telecoms integrated circuits, Siemens' ambition is to become the world number two, behind AT&T. Juergen Knorr states that it has almost achieved this ambition thanks to its complete range of solutions for GSM and DECT mobile telephone systems, its range of ISDN circuits, high frequency gallium arsenide components for satellite reception, and laser modules for broadband fiber-optic networks. Siemens also intends homing in on other sectors with a potential for high growth, such as consumer electronics, smartcard applications, and fuzzy logic.

Aerospatiale Head on International Projects, Airbus Restructuring, Arms, Exports

94WS0337A Duesseldorf WIRTSCHAFTSWOCHE in German 22 Apr 94 pp 54-55

[Interview with Louis Gallois, president of Aerospatiale, by Friederike Meier; date and place not given: "Completely New Methods"]

[Text] **Meier:** Mr. Gallois, the supersonic Concorde has swallowed up billions. Even so, you now want to build an even faster aircraft together with British Aerospace and Deutsche Aerospace. Does that really make sense?

Gallois: In the next millennium we will need increasingly faster and bigger long-range aircraft. For the Concorde successor we anticipate a volume of 500 aircraft.

Meier: But that is too few for several manufacturers. Boeing is already working on a new supersonic plane, and the Japanese will soon begin participating in that as well.

Gallois: There will only be one aircraft of this model worldwide. And we will certainly not build it with two partners. It is important for European industry to have mastered the state-of-the-art technology by the year 2000. That is the only way we can rightfully demand our share in this worldwide program.

Meier: The Europeans are already cooperating with Boeing on the research for the giant Super-Jumbo aircraft. In the future, will there only be partners and no longer competitors?

Gallois: On the contrary. The competition between Boeing and McDonnell Douglas, on the one hand, and European Airbus on the other is becoming increasingly stiff. This was just proved by the struggle for the large Saudi Arabian order for more than 60 commercial aircraft, which Airbus ultimately lost. Completely new methods were used for that. The U.S. government threw its entire weight into the balance and negotiated directly with the Saudis. Previously, that was only customary for military contracts.

Meier: With an eye on the United States, Dasa [German Aerospace Company] head Juergen Schrempp also likes to demand "the same right for everyone" and warns the politicians against job losses.

Gallois: In France and in Germany several million working hours were lost with the Saudi order. The Americans are setting the pace in our markets. So there is no point in whining—we must do exactly what they are doing.

Meier: More than from a lack of support from the political sector, however, the Airbus consortium suffers from its own structure. That is why Airbus head Jean Pierson for a long time now has been demanding conversion of the loose association into a corporation.

Gallois: Changing the legal form of Airbus Industrie is an enormous task. Until today 40 to 50 billion dollars have been invested in the Airbus. How should we divide that up? Today there are two majority companies—Dasa and we—but all partners have the same right to have a say. Would the British and the Spaniards be satisfied with minority shares? Basically, I am not opposed to changing the legal form, but today we must approach the problems that we have today.

Meier: In the competition with Boeing this is primarily the cost structure. And that can hardly be improved as long as the Airbus partners are simultaneously the main suppliers for the Airbus.

Gallois: We are reviewing the question of the partners' delivery prices to the Airbus.

Meier: Reviewing the delivery prices from Dasa to Fokker recently caused quite a lot of problems. With the result that Mr. Schrempp had to agree to a massive price cut.

Gallois: At Airbus we already have a kind of self-control. Once again: One would have to show concretely what a legal conversion could bring—taking into consideration the financial support by the partner nations. We need that urgently. After all, the U.S. government also supports Boeing massively—through NASA, through export financing and through credits from the Department of Defense.

Meier: In the arms industry as well the competition with the United States is heating up. The Europeans have only loose alliances to pit against the extreme concentration movement of the U.S. industry. Is that enough?

Gallois: In Europe we must work with national defense budgets. Nevertheless, we must join together more closely in the future. Aerospatiale and Dasa combined their helicopter production into a joint venture as early as 1991. Based on this example, we want to combine our guided missile and satellite activities even this year.

Meier: By so doing Dasa circumvents the German arms export controls.

Gallois: Over the 25 years of our cooperation with Dasa we have never violated German interests. The founding of a joint venture will change nothing in this respect. We have a very reliable control system in France.

Meier: But does not a united Europe also need uniform export regulations for armament goods?

Gallois: We do not want to complicate things. If we are able to regulate this with the Germans, just the two of us, why should we then discuss it in a group of 12? There are countries which have no military production at all, and for that reason could easily assume the role of moral guardians.

Meier: The privatization of Aerospatiale has now been postponed by the French government to after 1995. Does that limit your freedom of movement?

Gallois: Not as long as the state behaves like a normal stockholder. And until now it has. Furthermore, the privatization does not begin until 51 percent of the capital—so we still have 49 percent which we can offer to our partners.

Meier: To Dasa, for example? After all, Germans and Frenchmen are already making a profit of more than half of each partner's turnover in cooperations.

Gallois: At my level I really see no obstacle to an interlocking shareholding—as long as the balance is maintained. But that would perhaps primarily be of symbolic value. The planned joint enterprises in satellites and guided missiles are much more important than a five-percent ownership by Dasa or Daimler-Benz in Aerospatiale or the other way around.

Ariane Marketers Expect Fewer Satellite Launches, Beginning of Manned Flights

94WS0355A Frankfurt/Main FRANKFURTER ALLGEMEINE in German 25 Apr 94 p 19

["Arianespace Sees Less Demand for Launchings"]

[Text] Munich, 24 Apr - The 1994 space year began with a launch failure for Arianespace, the world market leader. On 18 January, Ariane 4, carrying two satellites, crashed into the sea shortly after launch because of a turbopump malfunction. This failure, however, seems not to have affected the prestige of the European space program nor the trust of the clients in the program. After the unsuccessful launch, the French marketing and management company Arianespace S.A. in Evry near Paris booked yet another booster rocket launching—this time carrying four satellites. By late 1996, providing there are no additional mishaps, Arianespace will have put about 40 satellites in space, thereby achieving a turnover of roughly $3 billion U.S. dollars.

Arianespace, the marketing and management company for Ariane rockets was set up by European organizations together with governmental and private agencies. French stockholders hold the largest share in the company. Among the German participants, Deutsche Aerospace and MAN play a major roll, having about a one-fifth share of Arianespace. The two German firms enjoy about the same proportional importance as suppliers.

Arianespace's contract book shows that the company has a good 60% share of the planned launchings of commercial satellites into space. The United States occupies a distance second position. General Dynamics and McDonnell Douglas together have launch contracts for 14 and 6 satellites, respectively. China's "Long March" rockets will make five such contract transport launchings, and Russia's "Proton" will make a single such commercial satellite launching for hard currency.

Horst Holsten, the man responsible for Ariane operations at Deutsche Aerospace AG, attributes Arianespace's dominant position, among other factors, to its transport capacity: "Aside from the Russian Proton, Ariane is the only booster rocket capable of carrying two satellites into space at once." Moreover, the European company is profiting from a bad decision made earlier by the Americans. The U.S. belief that the reusable "shuttle" would be capable of everything by carrying both astronauts and satellites into space has turned out to be economically unprofitable. The fact that the United States occupies the number two position in this market today, Holsten believes, can be attributed solely to the initiative of the two aforementioned U.S. companies.

The European space company experiences much less competitive pressure, in Holsten's opinion, from the Russian and Chinese competitors. At first, this is rather surprising because it had been feared a year ago that those two "low bidders" might undercut the prices clients would have to pay, regardless of Russia's and China's own actual costs. However, Holsten admits, that neither the Russians nor the Chinese have been very aggressive in the market place. Russia, especially, seems constrained with respect to making launches via international marketing. And both Russia and China suffer competitive disadvantages. In order to transport satellites over the Equator from their space centers, which are situated so far to the north, they require much more fuel than does Ariane, which is launched from its South American space center in French Guyana. In addition, the costs are not the only decisive criterion. The contracting client and the space transport company must work together intensively for several years before the satellite can be placed in orbit. The radical changes currently occurring in Russia and China are simply bad for business. Finally, the Europeans do not consider Japan, the newest competitor in space, to be a serious competitor yet for technical reasons, despite her recent successful launching of the H2 rocket.

Much points to the fact that Ariane will retain its top position in transporting commercial satellites into space for the foreseeable future, particularly since further technical and economic progress has been announced. Ariane 5 is tentatively scheduled to be launched on its maiden flight in late 1995. This new booster rocket will exceed Ariane 4's already high payload of 4,500 kilograms by almost one and a half tons. Consequently, the Arianes will be able to handle double launchings even if the weight of the communications satellites should increase from two to three tons. In addition, Arianespace will be in a position to lower its launch costs, which today run to about $100 million U.S. dollars, by about 10%, despite the higher payloads, because the new rocket will be equipped with less cost-driving liquid fuel engines.

In any event, Arianespace is aware of the fact that the demand for commercial satellite launchings will drop to about 25 per year until 1996 and then to from 16 to 19 by the end of this decade. Beginning in the year 2000 Arianespace anticipates a stabilization in the number of launchings at a level of 16-17 a year. This fall-off in launchings reflects the fact that the need for additional communications satellites has already been somewhat satisfied. The need for replacement operations has also softened. While the service life of the satellites in the 1980's was only 5 years, the present generation of satellites can

function satisfactorily for 15 years. However, Ariane is only considered marginally suitable for new applications as, for example, the transmission of data within companies or observations and surveillance of the Earth's surface. For such purposes, smaller satellites, weighing less than a ton, would be more suitable. These small satellites could, for example, be inserted in near space from an aircraft. In this field, the United States is again ahead. The Orbital Sciences Corp. has already developed the Pegasus carrier, capable of transporting small, light (200-kg), iridium satellites. The suppliers and managers of Ariane are therefore looking for a future in a non-commercial field. With its high payload, Ariane 5 could transport astronauts and capsules as well as undertake supply and support flights for space stations. In order to do this, however, Europe's financial policy makers would have to abandon their current reserve about backing manned space ventures, which are of course very expensive.

France: Renault Organizational Restructuring Reported

94WS0350C Paris L'USINE NOUVELLE in French 28 Apr 94 p 32

[Article by A.-G.V.: "Renault Unifying Design, Methods, Production"]

[Text] To enable it to react faster to the competition, Renault is profoundly modifying its organization chart.

"Work better and faster." Renault intends to go well beyond hackneyed managerial slogans, to decompartmentalizing the corporation and demolishing the old baronies. As of 1 July of this year, it will merge the managements of its components sector's design, methods, and production departments, and will combine the design and methods engineering departments of its complete-vehicles sector into a single unit. The details of the plan will be firmed up by mid-May.

This restructuring is in keeping with the philosophy, dating back to some five years ago, of designing vehicles by way of "multidisciplinary planning plateaus" located upstream at the fountainhead, and staffed jointly by the design, production, marketing, and procurement people, working together with the representatives of the suppliers.

Shortening Vehicle Development Times

By improving the synchronizing of the design and industrialization phases, the new organization will contribute to the shortening of vehicle development times, from the 58 months it took for the recent Laguna, for example, to the expected 49 months for the replacement of the R 19 (X64 Program), which is to be launched in 1995 under the leadership of Michel Faivre-Duboz. The Japanese are now down to 36 months, a level that the French car makers do not expect to be able to attain before year 2000.

The horizontal merging of managements that, to date, have been the product of vastly different cultures will not be achieved without pain along the lines of the difficulties being experienced by PSA (Peugeot Corporation) as it tries to institute communication between design and methods, which it merged in 1991. "Renault still suffers from a lack of homogeneity in its vehicle development methods, which are too dependent upon the personalities of the project managers. Nor does the corporation always succeed in coordinating the activity of its design departments and those of the suppliers. Many design studies are made in duplicate, says a consultant."

Time is pressing. Although the two French enterprises, Renault and PSA, react faster today and more effectively than Fiat and Volkswagen, they are still being left behind by the Japanese firms and General Motors Europe.

[Box]:

Current Managements

DESIGN: Bodies, mechanical components, materials, etc. Manager: Philippe Ventre.

METHODS: Body assembly, mechanical operations, etc. Manager: Manuel Roldan.

PRODUCTION: Assembly, mechanical operations, etc. Manager: Philippe Chauvel.

Managements as of 1 July 94

MECHANICAL ENGINEERING: Design, methods, production. Manager: Philippe Chauvel.

COMPLETE VEHICLES: Design, methods. Manager: Philippe Ventre.

COMPLETE VEHICLES: Production. Manager: Michel Gornet.

Bull's Quarterly Figures Improved, Downsizing to Continue

94P60238A Paris LE MONDE in French 7 May 94 p20

[Article by Caroline Monnot: "Bull's Accounts Improve but New Personnel Reductions Are Still Contemplated"]

[Text] "Think positive!" Jean-Marie Descarpentries' credo pleases the State's shareholders but it leaves the employees perplexed. The 1994 first quarter results have shown quite clearly the sharp (+20 percent) increase in business turnover, achieved mainly through Zenith Data Systems microcomputer subsidiary's aggressive sales. As a result of the drastic hunt for expense (reductions), losses have been nicely cut down to 942 million francs, a 45.4 percent drop. In spite of these results, accompanied by a massive reduction of personnel, the company's worries are still far from being over. According to the analysis of someone close to the management, "The group operates henceforth in a two-speed regime. First, there is the team around Descarpentries—the eleven-member Bull's Executive Board—which is a smoothly working and well sutured structure. And then there are the employees, which remain deeply worried and who feel tossed about."

The position taken has been to break with the "logic of decline" which, as Mr. Descarpentries had explained this recently, consisted in ascertaining a fall in business turnover to be followed by a plan for restructuring cost reductions. Among priorities the first has been given to sales development. Concomitant to this, by paying the first recapitalization installment—4.5 billion francs in

December 1993—the financial burden was reduced. The net indebtedness has been almost halved.

For Bull's employees the June due date is getting near. After having the group placed under stress, the management at this time should draw up a balance sheet and decide if new personnel cuts are still necessary. In the words of the group's CEO "there will be no more global plans," "because," as a representative of the personnel office said, "the objective now is to negotiate entity by entity, or site by site. The negotiations which are being held at the level of Bull SA are falling apart. For instance, at the Louveciennes site, the plan calls for the creation of two distinct establishments, one playing the role of a social headquarters, and the other being Bull France."

The Pache plan—named after Mr. Descarpentries' predecessor—which recommended eliminating six thousand five hundred employees of the group on a voluntary basis, most of them in France, has been falling short of its goals. Recently, Bull has resorted to a new practice of work stoppages. These affected over seven hundred persons. Under this practice a number of employees must interrupt their activities. No further details were given. Tn our profession work stoppages are frequent. There are the projects that have been just finished. There are "stand-by" periods before passing over to the next project. Tn other words, there are very few projects that really stop. The employees concerned stay alert, to them the future is unclear. Some are to be reclassified internally. Others see themselves proposed for training. Still others will be pushed to quit. It is a situation of complete confusion. People are completely disoriented. As an employee explained, "the effect is deplorable."

Using the shock, the general mobilization—according to a veteran employee, "this has been indispensable and it will be followed by a transition to other things. For six months, the method of management has been very brutal. It will have to go on to other things, to try stabilizing the group somewhat." Of the BOC's members—the group of responsible who together worked out Bull's business turnover numbers in January—ten have departed under publicity pressure at April's beginning because of their unsatisfactory performance.

The group must be stabilized. Mr. Descarpentries' privatization plan provides for a first batch of Bull capital to be turned over to its employees. Parallel to this, the management indicated, Bull is negotiating with a "five partners," some of which might become shareholders at the moment of privatization, not.

Netherlands: Fokker Negotiates for State Support

94P60255A Paris LE MONDE, in French 24 May 94 p 15

[Text]

Fokker Expects Dutch Government Support

Fokker, the aerospace manufacturer, in its unrelenting course to reduce production costs, has just cleared an important stage by obtaining a "substantial" price rebate on fuselages supplied to them by Deutsche Airbus.

Although Deutsche Airbus is, as Fokker itself, also a Deutsche Aerospace (DASA) subsidiary, it did nevertheless supply its parts to the latter at much higher than average world prices (over 37 percent for the F-70, and over 57 percent for the F-100), on the account of a contract existing before DASA's buying into the Dutch aircraf t manufacturer's capital, an agreement not revised since. Because this is henceforth a fact to have taken effect retroactive to 1 January, Fokker, who has been negotiating new conditions with its other suppliers (the Rolls Royce engine and the Shorts wing manufacturers), has in this way obtained a little breathing space while waiting for the market's return in 1996, as forecasted by its new owner.

Moreover, the past agreement with DASA has been set by the economic affairs minister to a precondition of state support; Fokker's 1993 balance sheet showed a 460 million florin loss (1.4 million francs), which cut into its funds, and whose present financial problems the state would like to know.

The company's management has denied having financial problems, nevertheless it has confirmed that, presently, the company is negotiating with the Government in the Hagues for a loan and the (right to) set up an association for leasing its craft with other partners. In the words of Fokker CE0 Ben Van Schaik—who is confident that the issue will be settled positively and quickly—"The State will have to support us until 1996."

EAST-WEST RELATIONS

Netherlands: Russia, Netherlands Strengthen Scientific Ties

BR1204085794 Zoetermeer SCIENCE POLICY in English Dec 93 p 5

[Unattributed article: "Scientific Ties with Russia Strengthened"]

[Text] The scientific ties between the Russian Federation and the Netherlands are to be strengthened. After the broad programme of collaboration with the Netherlands Organisation for Scientific Research, which has proved so successful, Russian-Dutch collaboration will now be intensified in four areas: agriculture and nutrition, environment, fundamental research and management. This was the joint decision reached by a Russian delegation, the Dutch Ministry of Education and Science and the Netherlands Organisation for Scientific Research. The agreements involve a sum of over 4 million guilders in 1994. The level of funding for 1995 and 1996 will depend on the results achieved.

These agreements are the first step in the implementation of the Memorandum of Understanding drawn up in June 1993 by Education and Science Minister Ritzen with his Russian counterparts from the Ministry of Science and Technology Policy and the State Committee for Higher Education. The implementation of this memorandum will be facilitated by the experience that the NWO [National Organization for Scientific Research] has gained in a collaborative programme for countries of the former

Soviet Union. It was launched in 1992, with a special 15 million guilder subsidy from the Ministry of Education and Science.

The agreements embrace cooperation in four well-defined fields. Workshops are to be organised for agriculture and nutrition research. Questions to be raised in connection with environmental research will be soil contamination and the risks of nuclear energy.

Several fundamental research fields have been outlined: mathematics and physics; oceanography and earth sciences; health care, energy and archeology. The emphasis in the management of scientific research will be on the inspection of research, peer review and the marketing of research results. The pursuit of mutual interests will form the starting-point for all projects. The first workshops are scheduled to start at the beginning of 1994.

France, Russia To Enlarge S&T Cooperation

94WS0271A Paris AFP SCIENCES in French 24 Feb 94 p

[Article: "French-Russian Scientific and Technical Cooperation Revived"]

[Text] Moscow—To counteract the brain drain as much as possible, help Russia "take better root in Europe," and facilitate the teaching of French and exchanges of researchers, French-Russian scientific and technical cooperation is going to be revived and expanded following the visit to Moscow on 16 and 17 February by Francois Fillon, French minister of higher education and research.

"It is with fascination that we are following developments in Russia in the political, economic, and social areas," Fillon said during a visit with Boris Saltykov, Russia's minister of science and technology policy.

Fillon added: "I think that higher education and research can be of use to those developments. We must find new ideas and ambitious projects to take our cooperation to a more developed stage. We are not trying to attract your researchers to France. What we want is balanced cooperation consonant with each party's interests. We think that Russia has chosen to be part of Europe and that that choice is correct and moves in the direction of democracy. As was true when we supported your participation in the European Eureka program, so we are prepared to help you in all areas that we will define together."

What remains is to set priorities and means, taking into account the forms of cooperation already existing directly between French and Russian research centers, laboratories, and manufacturers and keeping in mind the budget problems that exist on both sides.

To do that, the first meeting by the new Joint Committee on Scientific and Technical Cooperation will be held in Paris at the end of March or the beginning of April. On the French side, that committee is headed by Jacques-Louis Lions of the French Academy.

Computer science, space, aeronautics, medicine and biology, and oceanology are the areas in which the French are prepared to cooperate with the Russians because those are areas in which the latter have well-known and well-equipped laboratories, institutes, and research centers that are currently underutilized for lack of money or of contracts from ministries—the Ministry of Defense, for example—that are their traditional source of orders. That is also why both sides say they are prepared to cooperate on dual technologies as well—that is, those with civilian as well as military applications. The joint committee will include a representative of the General Delegation for Weapons (DGA), which is already represented in Moscow.

Obviously, the hope on the Russian side is to reorganize cooperation along lines that would give the ministry, which is in the midst of a struggle with the Academy of Sciences (RAN) for influence, more control over or knowledge about ties between the two countries.

Regardless of the area involved, it emerges from the discussions that the Russians are looking for any cooperation likely to keep operations going at such research centers as the Central Aerohydrodynamics Institute (TSAGUI) in Jukovsky, about 40 kilometers from Moscow, which now has only 8,000 employees compared to the 15,000 who once worked there.

Since 1935, almost all Russian aircraft, both civilian and military, have been designed and tested there. It has about 15 wind tunnels and vacuum chambers or simulation chambers, and its experts can carry out various tests, including tests on the Burane shuttle, in all temperature ranges from -250 to +20,000 degrees C. and at speeds ranging from one to 20 times the speed of sound (Mach 1 to 20). In the field of pressures, some of its facilities go as high as 10,000 atmospheres.

With its unique equipment, TSAGUI is now looking all over the world for partners who can ensure its conversion. Abandonment of the European Hermes spacecraft program, for which it had contracts with the French firm Dassault in particular, has left one more gap in its workload. In those conditions, it is difficult to motivate young researchers, all the more since their salaries no longer match their qualifications, as their director, German Zagainov, admitted.

The desire to cooperate also extends to the field of scientific and technical information. The ruble crisis and inflation are depriving researchers of access to periodicals and making it expensive to keep up with their foreign colleagues. It remains to find points of compatibility between information networks and data banks and adequate financing and to better identify the specific missions or fields of particular Russian laboratories.

Another aspect of future cooperation—the beginning of regional exchanges of researchers to facilitate the establishment of state scientific centers in Russia—was also discussed. The first initiative of this kind may take place between Sophia-Antipolis and Novosibirsk.

During Fillon's visit, the CNRS [National Scientific Research Center] and the Russian Academy of Sciences signed a memorandum providing for new twinnings between laboratories, while the French Institute for Research on Exploitation of the Ocean (Ifremer) signed a

framework agreement with the Russian Ministry of Science in the area of oceanology to replace the one that had been in effect with the former USSR since 1979 (see the chapter on "Oceanology" [not included here]).

As regards the CNRS, four new twinnings with laboratories associated with the RAN were made official. Two will be concerned with life sciences, one with catalytic chemistry, and one with human and social sciences. A fifth twinning, this one in the areas of robotics and automation, will come into being within the next few weeks.

University Cooperation

During a meeting with Minister of Higher Education Valeri Kinelev, the subject of cooperation between universities was also discussed. The Russians are looking for training in the areas of economics, law, management, PME-PMI [small and medium-size business and industry], culture, and study of French language. The French, like the Russians, hope to halt the decline in the number of French-speaking specialists in Russia.

The desire was expressed on both sides to launch ambitious projects organized around those already existing in the areas of computer science, the learning of Russian in France and of French in Russia, and so on. The idea of establishing a French-Russian University in Russia seems to making progress as a way of rounding out the success of the Moscow French University School. An attempt will be made to harmonize the equivalence of degree courses and degrees to facilitate the exchange of students, researchers, and professors and also to find a way to speed up the process of issuing visas and improve living conditions in France for lengthy stays by Russian researchers and their families.

A successful example of that cooperation between universities, and one involving neither the ministry nor the RAN, was the establishment in December of the Liapunov Institute of Applied Mathematics, a joint project of the National Institute for Research on Data Processing and Automation (INRIA) and the Moscow State University, better known as Lomonosov University. That initiative is distinctive in that it links a manufacturer—the Dassault group—to its two founding institutions and uses Russian and French mathematicians to design advanced research software that will be used jointly.

Sextant To Modernize Russian MiG-AT

94WS0271B Paris AFP SCIENCES in French 24 Feb 94 p 11

[Article: "Sextant Avionics Will Modernize MiG-AT On-Board Electronics"]

[Text] Singapore—The Russian firm Mikoyan, manufacturer of the MiG, has chosen Sextant Avionics, a subsidiary of France's Thomson-CSF group, to supply the on-board electronics for its MiG-AT training aircraft, the engine in which is supplied by SNECMA. This was announced by Anatoli Beslovet, vice president of Mikoyan, on 22 February.

Sextant, which has received export authorization from the French Government, is offering an avionics system called Topflight, which, with the help of the Russian group Gosnias (software), will be incorporated into the future MiG-AT trainer.

SNECMA, an affiliate of France's Turbomeca firm, manufactures the Larzac engine, which is used on France's Alpha Jet trainers and will be adapted for the MiG-AT. This is a good deal for SNECMA, since Dassault has halted production of the Alpha Jet.

"Development of the MiG-AT program is on schedule. The first prototypes should be flying in 1995," said Gerard Renon, president of SNECMA, at a press conference held during the Singapore Air Show. No information on development costs or expected sales was given.

Beslovet stressed the "political agreement" that enabled the French companies to participate in modernizing the Russian aircraft following the signing early in February of a cooperation agreement between the French and Russian ministers of defense, Francois Leotard and Pavel Grachev. Beslovet said: "Our objective is to have this aircraft flying at the next Le Bourget Air Show, in 1995."

Besides supplying the Russian market, the MiG-AT will also be offered for export. The world market for training aircraft is "very strong" because half of those now in use are over 20 years old, Jean-Robert Martin, president of Sextant Avionics, emphasized.

According to Beslovet, the potential market is estimated at from 600 to 1,200 aircraft in all, including 500 for Russia (200 over the next five years). In Russia, however, the MiG-AT will be competing with the Yakovlev design, which will not use Western equipment.

It was emphasized by Gerard Le Bretton, chief of the MiG modernization program at Thomson-CSF, that in the view of the French manufacturers, this agreement represents more than a commercial opportunity. It involves a market that the Americans and Israelis are also vying for.

Philips Invests in Printed Circuit Production Plant in France

94WS0290B Paris L'USINE NOUVELLE in French 24 Mar 94 p 34

[Article by Jean-Pierre Jolivet: "Philips Beefs Up Its Chips"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Philips will spend 500 million French francs [Fr] to double the integrated circuit production capability of its Caen factory over the next three years. The move will also create 200 jobs.

After the drastic cuts of the Centurion recovery plan, the Eindhoven group's decision to invest in integrated circuit production shows its strong desire to rebalance its semiconductor manufacturing base in Europe.

So the Caen plant is taking on more importance within Philips's Semiconductor Division, alongside the Dutch factory of Nimegue and the German plant in Hambourg. The Normandy facility is being equipped with a second process line able to implement 0.7-micron technologies (compared to 1 micron today).

Chip Production Is 90-Percent Exported

At the same time, integrated circuits will be manufactured on silicon wafers 150 millimeters in diameter (against 125 now), boosting productivity. "This shores up our role as a center of expertise in submicronic CMOS circuits for video, telecommunications, and hyperfrequency applications," says Jean-Pierre Regnier, manufacturing director of the Caen plant. Indeed, Caen—which employs 830 people, including 500 engineers and technicians—exported 90 percent of the 300 million chips it made in 1993.

The expansion of Philips Components' manufacturing base is consistent with the French subsidiary's new missions in communications and multimedia technologies. Philips Components had a turnover of Fr4 billion in 1993.

Philips France, one of the group's first national subsidiaries to restructure, is now reaping the dividends.

Boxed Material: Technologies Developed at the Caen Center

I. CMOS integrated circuits:

—tuner circuits for earth and satellite TV - D/A video converters - checking circuits for small engines - frequency synthesizer circuits for mobile telephony

II. Bipolar hyperfrequency transistors on silicon and power transistors

The Caen center, which exports 90 percent of what it makes, has worldwide responsibility within the Philips group for the development, marketing, and production of all the above product lines.

France's Elf Sanofi, Hungary's Chinoin Collaboration Reviewed

94WS0290A Paris L'USINE NOUVELLE in French 24 Mar 94 p 31

[Article by Jacqueline Mattei: "Chinoin's Lucrative Contribution to Sanofi"; first paragraph is L'USINE NOUVELLE introduction]

[Text] In a strategy that is in line with that of the French, the Hungarian firm has refocused its research on its areas of excellence.

Investments in east European countries can pay off. After three years of collaboration with the Hungarian pharmaceutical company Chinoin, overall results have been positive for Elf Sanofi, whose joint venture with Sterling, Sanofi-Winthrop, acquired a 40 percent interest in Chinoin in 1991, rising to 51 percent in 1993.

Commercially, Chinoin has become Elf Sanofi's bridgehead in central European and CIS markets. Although a bit disappointing for now, those markets are expected to grow sharply over the next few years. The Hungarian firm has also made a strong research contribution—a valuable fringe benefit for the French group.

Chinoin was founded in 1912 and has a long Hungarian chemical tradition behind it. The firm had independently launched two important molecules in a number of markets: ipriflavone for osteoporosis, and selegiline hydrochloride to treat Parkinson's disease. Chinoin even managed to register the second in the United States in 1988, quite a feat for an east European company. The Hungarian company now benefits from Sanofi's and Sterling Winthrop's alliance to develop their medications in various regions of the world. Elf Sanofi, for instance, is working on developing and launching Chinoin products in European markets where they formerly were unknown. The only snag is that in countries (including France) where they are already marketed, Chinoin licensed them to such large groups as Schering Plough, Sandoz, and Takeda. Elf Sanofi is now actively negotiating to recover the sales rights or conclude comarketing agreements.

Beginning in 1991, Chinoin researchers (400 out of a staff of 3,000) began to work closely with those of Sanofi. The result was a shift by Chinoin back to those areas in which it excelled, namely the central nervous system, osteoporosis, and respiratory ailments. The firm's reorientation meshes perfectly with the current strategy of Elf Sanofi, which assessed its research options and decided to put anticancer work on hold to focus on cardiovascular, central nervous system, and osteoporosis treatments.

Significant Strides in Clinical Development

But the company is seeking to develop as many projects as possible in the lines of research it has selected. Chinoin has much to offer in the last two areas. The Hungarian laboratory is conducting research on degenerative illnesses using a new molecule derived from its anti-Parkinson's drug, parafluoro-selegiline. The new substance may have an effect on Alzheimer's disease, an avenue which Sanofi researchers are also exploring with two molecules in phase I or II.

The French manufacturer has further entrusted Chinoin with an anti-epileptic research project that employs an original pharmacological approach. Finally, Sanofi has put the Hungarian firm in charge of a clinical study to register in Europe a molecule Sanofi devised to treat asthma. The French company's decisions give some idea of how much progress the Hungarians have made in conducting clinical developments.

But "Chinoin's great area of expertise is basic chemical research," stresses Philippe Reulet, the group's director of industrial resources. The company has discovered active ingredients that are effective at smaller doses than those currently used in West European products, whether pharmaceutical, veterinary, or fine chemical. Consequently, Chinoin supplies active ingredients to groups such as Rhone-Poulenc and Sandoz, and is highly competent in prostaglandin synthesis as well. Finally, the Hungarian firm has teamed up with Elf Atochem on a EUREKA project involving cypermethrine analogues, which could represent a step forward in plant health products.

Boxed Material: Marriage Offspring

I. Products jointly developed by Sanofi and Sterling Winthrop

Three that originated at Sanofi:

—Clopidogrel (thromboses) - Tiludronate (osteoporosis) - Anti-angiotensine II (hypertension)

Three that originated at Sterling Winthrop:

—OMP (imaging) - Peg Sod (cranial traumas) - Tirapazamine (cancerology)

Chinoin products developed by Sanofi Recherche:

—Ipriflavone (osteoporosis) for registration in new markets - Selegiline hydrochloride (anti-Parkinson's) for new pharmaceutical forms - Parafluoroselegiline, a phase I anti-Alzheimer's.

German Expert on Technological Cooperation With Russia

94WS0319A Duesseldorf HANDELSBLATT in German 13 Apr 94 p B2

[Technology Discussion/Military High-Tech Developments in Russia Useful for Civilian Applications]

[Text] Berlin - "In Russia there is still enormous potential in innovative capabilities in science and technology," according to the assessment of Prof. Ehrenfried Stelzer, member of the International Academy of Engineers in Moscow and vice president of the International Institute of Engineering Safety (IIES) in Berlin, an institution which lets its influence in technical safety be felt across national borders. In addition to his activities for IIES, Stelzer is involved with facilitating East-West cooperation. He wants to bring managers from Western companies and top-level developers from Russia together at the conference table.

With the transition from confrontation to cooperation, barriers in Russian science continue to fall, even if the core of strategic military technologies will for the foreseeable future remain off-limits for unlimited business exploitation. However, in the still sensitive spheres of military interests, things are starting to move toward change, although admittedly not to the extent nor with the speed expected by the euphorically [optimistic].

Stelzer: "On the Russian side, meanwhile, readiness to interest foreign companies in their own technical scientific accomplishments predominates; and people are beginning to actively seek out cooperating partners." As an example, he mentions the area of small airplanes that are ready to go into production which were originally developed for military purposes. They boast new aerodynamics, can take off—after extremely short ground contact—and land on water, snow and sand, and have ecological and economic advantages over conventional small planes as well as helicopters. Compared to airplanes, they are three to four times more economical: compared to helicopters, actually six times more so.

Immediate and economical production of different versions [of the planes] (for 12, 25, 50 or 75 passengers, with varying flying speeds) would be possible in Russian production plants. "Western participation, even by means of a consortium, could be interesting here," Stelzer thinks, especially since a joint production at a Russian location would be linked with the development of a considerable domestic market. Other interesting non-spinning small airplanes were developed at the Molnija plant in Moscow, whose chief designer is Gleb Losino-Losinsky, the father of the Russian Buran space shuttle.

A classic kind of change-over consists of using former military production plants to manufacture all manner of civilian products. Stelzer: "Whoever has untill now been developing and producing antiballistic systems, for example, can also build telephone equipment suitable for an ISDN [integrated services digital network] with caller-ID and, if desired, screened signal transmission."

Many [Instances of] Economic Cooperation Are Already Working

Complex munitions factories can also be split up into heterogeneous segments related by technological field (areas like materials, design, electronics, assembly, among others). These are not theoretical examples but are, rather, successful forms of economic cooperation already being practiced between installations from the Russian military industrial complex and Western, including German, companies.

The Russians, Ukrainians, Belorussians or Kazakhstanis are each primarily interested in a net product in their own regions and are hoping "for the maintenance or re-establishment of productive structures which would be able to continue developing and growing together into larger productive networks," according to Stelzer. There is still an opportunity in this decade to create the conditions necessary for a far-sighted transition from a centralized, socialist economy controlled by command to a market economy appropriate to Russia's specific initial conditions—a transition which avoids dangerous social tensions and outbreaks.

Even just trade would be attractive in view of Russia's immeasurable natural resources, even if they cannot be exploited on an unlimited basis with economic efficiency. The concentrations of metals produced in Russia, particularly of the rare elements, are known for their high degree of purity—this, too, is a result of the level of technology which has been reached. This is generally valid as well for Russia's high-chemistry industry [as written] which would be able to fulfil many customers' wishes for synthesizing and manufacturing compounds. Stelzer: "For German industry, the main advantage of cooperation lies in the fact that Russian science and technology are rich in original and independent solutions that are already usable as they are."

How the West has from time to time still ignored original Russian developments is illustrated by the examples of continuous low pressure diamond synthesis (Spizyn, Builow, Derjagin) and surface coating with polycrystal synthetic diamonds, [developments] which were first recognized years after their original publication and which only afterwards could be successfully copied

Another field in which Russian scientists have done notable work is the area of materials. For example, the heat-protective tiles for the Buran spacecraft in combination with extremely heat and cold resistant elastic adhesives prove to have substantially better performance characteristics—also because of their well calculated shape—than the corresponding American developments—gauged by, among other things, their "chipping quota." Russian composite materials of varying origins, compositions and intended uses (from air and space travel to mechanical engineering to organ prosthetics), graphite products, adhesives and similar sophisticated materials are among the highest achievements of Russian research and engineering expertise. They are released for Western business partners on a case by case basis.

Russia Can Offer the West Original Solutions

"Examples have shown that awarding jobs in research and development to Russian high-tech partners is not only interesting to consolidated companies but also to medium sized companies as well," according to Stelzer. Thus, a company from Southern Germany, which manufactures electronics systems for civilian purposes, awarded an R&D [research and development] contract to a former institute of military technology in St. Petersburg. "Very good people are now working there for the German company on terms which are economically favorable for the German partner and which help the Russian partner remain viable."

In this first stage of R&D cooperation, the advantages for the German firm awarding the contract are especially evident: "Creative, individually performed, non-standardized work is valuable manpower in contrast to mass production which is strongly location-irrelevant, automated, short on operator participation and, thus, as a rule less cost effective [as written]." To begin economic cooperation in research and development is not only a logical and effective means. Because it can be maneuvered gradually using trial and error, it might also carry less risk in the case of financially tenable start-ups than would cooperation in production.

Stelzer: "R&D cooperation therefore recommends itself as a more easily controllable entrance [into cooperative ventures] which, if necessary, can be limited—in conformance with contractual fidelity; and as a trial phase which provides the necessary security for the next step." It can, however, also be successful as an autonomous phase in itself.

France: GEC-Alsthom, Romanian Railroads Set Up Joint Venture

94WS0320B Paris LE MONDE in French 19 Apr 94 p 19

[Article by Bucharest correspondent Christophe Chatelot: "In Partnership With Faur (Railroad Equipment Manufacturer), GEC-Alsthom Is Gaining a Foothold in Romania"—first paragraph is LE MONDE introduction]

[Text] On the occasion of Romanian president Ion Iliescu's visit to La Rochelle, as part of his official visit to France on 14-16 April, GEC-Alsthom and the Romanian state-owned company Faur officially announced their partnership in a joint company formed under Romanian law. A draft agreement was signed to that effect in Bucharest at the end of March by the Romanian locomotive manufacturer and the French-British group, which transferred part of its technology.

The agreement comes just in time for Romania, which is bogged down in problems having to do with the reorganization of its oversized industrial sector. The arrival of GEC-Alsthom follows a call for bids issued by SNCFR (the Rumanian railroad company) which Faur and GEC-Alsthom won a few months ago over their rival, the Swiss-Swedish group ABB [Swedish General Electric Corporation-Brown Boveri]. The SNCFR order is for a first delivery of 70 motor coaches; the contract, worth $150 million, should be signed soon.

Four years after the change of regime, the Faur company, like the rest of the Romanian industry, is still trying to cope with huge problems inherited from the former communist system. Overstaffed, it is now paying for the investments that were not made during the past 20 years. Its products do not sell in the West and can no longer be sold on its former traditional markets, which disappeared when the Comecon collapsed.

Rumania, therefore, needs contracts like this one with GEC-Alsthom in order to attract foreign investors and attempt to salvage what it can of an industry which still accounts for nearly 45 percent of the gross domestic product. We must recognize, however, that until now foreign capital tends to bypass this country in favor of its Central and East European neighbors.

France, Russia to Expand Satellite-Land-Observation Cooperation

94WS0332D Paris AFP SCIENCES in French 28 Apr 94 pp 4, 5

[Text] Paris—Starting this June and July, the French and Russians will work together in remote sensing and Earth observation to study the environmental effects of oil and gas mining in Siberia and devise methods for inventorying the Russian forest.

The two projects are slated to run for a year, and were decided upon during the 30th Franco-Russian space cooperation meetings, which took place at the National Center for Space Studies (CNES) in Toulouse 18-21 April. Arlene Ammar, head of Earth observation applications at the CNES, indicated that the two programs were selected for their demonstrative character from among the six proposed by various sources at a colloquium in Saint-Petersburg two months ago. They will be supported by the CNES and the Russian Space Agency (RKA).

The scientists and contracting companies will use three types of satellites, featuring different observation and data-recording devices. France will provide SPOTs, and Russia will supply Resources and Almaz-1s.

France's Bureau of Geological and Mining Research (BRGM) and ISTAR Co., and the Russian firm PLANETA will evaluate the consequences of Siberian oil and gas

mining operations. The latter are known for ignoring both the effects of their work on the particularly fragile vegetation of the tundra and oil- and gasline leaks. Russian and international environmental organizations have often denounced the operators' disregard for the environment.

Two test sites will be used to develop the methodology to inventory Russia's forests, which make up one quarter of the world's stock. One is in the Vladimir region, 200 km east of Moscow, and the other in Kostroma, near Ivanovo (300 km north of the Russian capital). Specialists will be able to use the sites as a basis for studying the entire Siberian forest, its problems, exploitation, and evolution, and for planning reforestation campaigns and sites.

The Russian participants in this project are the International Forests Institute and a number of laboratories. The French side is represented by the National Forests Institute (INF), the National Center for Agricultural Machines, Rural Engineering, and Forests (CEMAGREF), and the SCOT Consulting firm.

The CNES subsidiary Spot Image, which markets Spot satellite pictures, will provide French satellite data that will be corroborated by data from Russian birds. "The choice of these projects does not rule out other areas for collaboration," pointed out Ammar, "especially as participants in the Saint-Petersburg colloquium also proposed agriculture and regional development, and the application of remote sensing to Russia's geography and geology."

Eighty engineers and scientists from both countries took part in the meetings. RKA director Yuri Koptiev headed the Russian delegation, and Rene Pellat and Jean-Daniel Levi, president and general director of the French space agency respectively, led the French delegates.

EUROPE-ASIA RELATIONS

French Aviation Industry Seeks Asia Trade

94WS0271C Paris AFP SCIENCES in French 24 Feb 94 pp 12-13

[Article: "French Manufacturers 'Not Opposed' to Technology Transfers to Asia"]

[Text] Singapore—French aircraft manufacturers are "ready to consider any form of cooperation with countries wishing to do so" and "are not opposed to technology transfers" to Asia, according to a statement on 21 February by Serge Dassault, president of the French Aeronautical and Space Industries Group (GIFAS).

With an annual turnover of $19 billion in 1992, the French aircraft industry exports over half of its production to 115 countries, Dassault pointed out in connection with the Singapore Air Show, where about 60 French firms are represented.

Total turnover by French manufacturing firms affiliated with GIFAS is expected to show a drop of 8 percent for 1993, and new orders probably declined by some 20 percent, according to a well-placed source. This makes exports all the more vital to those firms.

In the countries of Southeast Asia, France is the third-largest aircraft and space supplier, after Great Britain and the United States.

By way of example, 25 percent of Aerospatiale's orders come from that part of the world, whereas Asia absorbs only about 5 percent of French industry's production overall. The Aerospatiale group, which is part of the European Airbus consortium, has picked China as its priority marketing target for 1994.

According to Dassault, the ASEAN countries provided the French aircraft industry with $300 million worth of orders in 1992 and accounted for over $400 million of its turnover, with 80 percent of the equipment delivered being civilian.

Including China, Taiwan, and Japan, orders to French industry totaled $5 billion in 1992 thanks to Taiwan's order for 60 Mirage 2000's, Dassault said. But no large-scale contracts have been announced in that region since then.

Dassault praised France's policy on exports of military equipment, which he said was very open. "When we deliver an aircraft abroad, it is equipped with all the most modern countermeasures and missiles," he said, "whereas that is not the case with U.S. exports."

In Singapore, Matra and Airbus confirmed orders that had already been hinted at. In the military area, Matra-Defense Space confirmed that the Singapore Armed Forces had chosen Mistral light surface-to-air missiles for their air defense. The contract in question was signed two years ago and has already earned "several hundred million francs" since 1992 for Matra, which, at the request of its customer, had never announced the deal publicly. The light missile system, which is already operational in the Singapore Army, has been sold to four Asian countries including South Korea.

In the civilian area, Airbus announced confirmation of a firm order for six A340/330 jumbo jets from the Hong Kong Cathay Pacific Airline, which had already ordered 10 A330's. Airbus had announced Cathay Pacific's intention to purchase in December. The aircraft in question, equipped with CFM56-5C jet engines (General Electric-SNECMA), are to be delivered over an eight-month period beginning in July 1996.

French manufacturers announced only one contract in Singapore, and it did not involve the Asia-Pacific zone. Matra Marconi Space and British Aerospace (BAe) have been selected to supply two Skynet-4 satellites for Great Britain (the contract is worth 300 million British pounds). Those satellites are to be launched after 1996 on a Delta 7925 rocket and Ariane-4. Manufacture of the platform will be shared equally by Matra Marconi Space and the BAe, but the Matra subsidiary will be completely responsible for the payload.

Japan's Akebono Brake To Open Research Center in Europe

94WS0306A Paris L'USINE NOUVELLE in French 31 Mar 94 p 29

[Article by Francois Vermeulen: "Akebono Brake Seeks To Grow in Europe"]

[Text] Japan's biggest manufacturer of automobile brakes will invest in Europe by way of an R&D center it plans to open there.

Akebono Brake plans to open a research and development center in the region of Paris in the spring of 1995. Around six engineers will work there. Its activity will be centered essentially on the development of friction materials and, if need be, on the building of prototypes.

Akebono Brake is following Japanese manufacturers installed in Europe. It also seeks entry into direct contact with the Europeans, including Peugeot and Renault. Its overriding objective, however, is to broaden its clientele. Akebono sells 85 percent of its production in Japan. The rest is sold in the United States and, to a very small extent, to Nissan in Great Britain.

At the same time, Akebono plans to build up its R&D structures in the United States. It plans to employ 48 persons there by 1998, versus the 24 currently employed in its Akebono Brake System Engineering Center in Detroit.

This decision follows Akebono's having sold asbestos-less brake components to Ford last year and, during the same period, having obtained an initial order from Chrysler. Akebono also owns a brake parts production unit in the United States, jointly with General Motors.

Akebono currently sells most of its production to Mitsubishi, Nissan, and Toyota. In 1993, it had a revenue of 106 billion yen, for a net profit of 489 million yen. Its stockholders are among the big names in the automobile industry. Toyota owns 15.4 percent of Akebono's capital shares; Nissan, 15.6 percent; Germany's equipment manufacturer Bosch, 13.8 percent; Isuzu, 5.1 percent; Hino, 2.3 percent; and Mitsubishi Motor, 1.5 percent. Suzuki is expected to join them.

France: State of Industrial Investment in China Reported

Automobile Industry

94WS0323A Paris L'USINE NOUVELLE in French 1 Apr 94 pp 56-57

[Article by Alain-Gabriel Verdevoye and Catherine Bozon: "Small Industry Keeps Pace with the Big Groups In China"; first paragraph is L'USINE NOUVELLE related articles introduction]

[Text] After the long rift caused by the sale of arms to Taiwan, Edouard Balladur will travel to China between 7 and 10 April to seal the reunion between Paris and Peking. His visit will be an eminently political one, and will pave the way for a host of company CEOs who have been invited—together with industry minister Gerard Longuet—to travel to China probably in late June. The resumption of untroubled bilateral relations will swing the door wide open again for French companies, which have not given up on China. GEC-Alsthom has submitted proposals for new thermal power stations, and expects orders to be placed this year. Together with Framatome, the group also has its eye on the second phase of the Daya Bay nuclear power plant. China has plans for dozens of dam projects, and Spie-Batignolles believes it has a good chance of winning a 3-billion-French-franc [Fr] contract for a batch of tunnels for the Xiaolangdi hydroelectric station. The Schneider subsidiary has just been prequalified as a civil engineer for the Canton subway system. These are undeniably big contracts. But China also harbors a huge potential for large-scale manufacturing projects. Citroen already plans to begin production of its Zx in May of 1996. Peugeot may triple its capacities in Canton. And Total is building a 100,000 barrel/day refinery in Dalian, in Manchuria. The Alcatel group, which opened the world's largest power plant factory in 1993, may soon form a new joint venture. In the wake of the big groups are a multitude of French suppliers, acting either as subcontractors, direct exporters, or—for the boldest of them—partners in joint ventures.

Automobiles Point the Way

PSA's and Renault's promising production volumes are spurring their suppliers to set up shop nearby.

Next 24 June, PSA head of purchasing Alain Carree will bring together 70 French equipment makers—already or soon to be established in China—at a big Peking convention on the occasion of the auto show. The meeting will be a first. "Suppliers have already signed 28 agreements, most of them involving technical assistance, with Chinese partners. Thirty-six others will be signed this year," explains the general director of Sogedac, the French manufacturer's central purchasing agency.

Because of the size of its projects and the traditional role equipment suppliers play, the auto industry is pointing the way in China. But other industrial ventures could have repercussions for French subcontractors as well. "We would like to draw in other French companies," insist spokespeople for Total, whose Dalian refinery project is worth Fr6 billion. This sentiment is echoed by engineering services firm Technip-Speichim, which manages to work for Rhone-Poulenc and Atochem while building its own agro-industrial plants. Michel Kehren, director of chemicals and fertilizers, sets the tone. "For another five years our equipment suppliers will be able to export from France. After that, they will have to find associations." The automobile subcontractor Sommer-Allibert is in turn becoming a contractor in China, and plans to take over two packaging and floor-covering factories.

The reason so many subcontractors can piggyback on the auto industry is that production has finally reached sufficient volumes. Peugeot, which barely assembled 20,000 505 sedans or station-wagons and 504 pickups in Canton last year, is discussing the possibility of tripling its capacities to 150,000 cars a year by introducing the 405. Its ultimate goal is to make 300,000 vehicles.

Citroen has teamed up with local truck maker Dong Feng, and has just completed earth work on 130 square meters in Wuhan, central China, for a plant to build 150,000 Zx's. The model, which will replace the small Ax, may then follow its big sister onto the production lines, boosting estimated production to 300,000 vehicles. Four hundred kilometers away in Xiangfan, another plant will supply engines and transmissions.

In the wake of the industrial projects of PSA—and of Renault, which will assemble utility vehicles near Wuhan—Valeo has just created a joint venture with Wenling Auto Parts Factory to make wiper systems. The heating, lighting, and clutch branches of the top French equipment maker are getting ready to do the same. Local automakers such as Dong Feng or foreigners such as Volkswagen are also targeted.

A Big Investment in Time and Personnel

Peugeot's 68-percent-owned equipment subsidiary Ecia has already signed two licensing agreements. It is building a factory in Canton to make plastic parts for—according to the equipment maker's plans—Peugeot. A second licensing agreement was reached with the Chinese exhaust system maker YAV, in the Wuhan region, for Citroen. A possible investment by the French company is being negotiated. Citroen may also form a joint venture with a plastics converter and processor. Ecia's German subsidiary, Leistritx, is trying to set up shop alongside German manufacturers.

Treves, which already operates a licensed facility near Shanghai for carpets and floor coverings, has concluded a preliminary agreement with Dong Feng to form a joint company in Wuhan. The firm will make door and rear panels. The instruments division of the Italian firm Magneti Marelli, headquartered in France, is setting up a joint venture in Canton in which it would like to hold 70 percent of the capital. "It is better to own a majority stake to avoid frictions with the Chinese management," quips the equipment maker, which is leary of granting difficult-to-control licenses.

"We must train our suppliers so that we achieve a 60-percent rate of local integration by 1996, then 90 percent," explains Alain Carree, who laconically adds, "Unfortunately, barely a hundred of them can follow us into China." The investment is considerable, both in time and personnel, and only pays off in the long term. French subcontractors are hurt by being too small. Initially, "We would be happy if we could just cover our costs," admits Ecia, whose Chinese projects will soon employ a staff of nearly 30.

Boxed Material: Where the French Are: The Principal French Industrial Investments in the People's Republic of China

1. Saint-Gobain/Peking: an "industrial ceramics" branch factory that makes electrocast refractories. A joint venture in which the French hold a majority interest.

2. Schneider/Tianjin: A modular circuit breaker factory. A joint venture with Chinese partners; the French are majority shareholder.

3. Total/Dalian: A refinery with a capacity of 5 million metric tons per year, started up in 1995. A joint venture in which Total holds a 20-percent stake.

4. Renault/Wuhan: A plant to assemble utility vehicles (Trafic) launched in 1994. A 45-percent-Renault-owned joint venture.

5. Citroen/Xiangfan: An engine and transmission factory started up in 1996. A joint venture owned 25 percent by Citroen.

6. Air liquide/Chongqing: A bottled gas packaging plant; joint venture with a local steelmaker. Air liquide holds a majority stake.

7. Citroen/Wuhan: Kicked off in 1996, a ZX assembly plant (150,000 a year to start). 25-percent-Citroen-owned joint venture.

8. Air liquide, Canton: A gas production plant for the chemical and metallurgy industries. Joint venture with a steelmaker.

9. CarnaudMetalbox/Canton: A can packaging plant. The joint venture is owned 85 percent by CMB, 10 percent by China's Yue Xing Group, and 5 percent by Chinese partners.

10. Peugeot/Canton: A plant to assemble 504 pickups and 505s. Peugeot holds a 22-percent stake in the joint venture.

11. Alcatel/Shanghai: Two factories, with a capacity of 5.5 million telephone lines a year. A joint venture with the Chinese government.

12. Air liquide/Shanghai: A facility for the production of industrial gases for electronics. A joint venture in which Air liquide holds a majority, 82-percent interest.

13. CarnaudMetalbox/Shanghai: A can packaging factory for beverages. A joint venture in which CMB holds 65 percent, and the Chinese agro-food group Mahing 35 percent.

14. Saint-Gobain/Shanghai: A plant for the manufacture of abrasive grinding wheels, part of Saint Gobain's "abrasives" branch.

Small/Medium Sized Firms

94WS0323B Paris L'USINE NOUVELLE in French 7 Apr 94 pp 58

[Article by Alain-Gabriel Verdevoye and Catherine Bozon: "A Successful Multiplier Effect"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Using contracts won by big French groups as a starting point, some small French companies have been able to develop steady business with China. Now they must keep it going...

GEC-Alsthom has contracted no less than Fr2 billion worth of work at its three thermal power plants in Luohuang, Jiangyu, and Beilungang, which have gone into service one after another since 1990. The company's rule is a well-established one: "We subcontract 60 percent of our big equipment contracts to French firms outside the group," GEC-Alsthom proudly points out.

This is manna from heaven for some small- and medium-size firms, who have been able to use it to get a toehold in the Middle Empire.

The Nancy pipe maker Nordon, for instance, worked for GEC-Alsthom and Air liquide before developing steady business in the agro-food industry. The result has been Fr50 million in sales this year in China, or 5 percent of the firm's total turnover.

The butterfly-valve specialist Amri, which made its name by working on thermal and nuclear power plants and water treatment projects, expects to write Fr100 million in contracts a year in China in the short term. Most of them will be direct. These are significant figures for a company which posted some Fr650 million in sales last year.

The Charentes industrial faucet maker SNRI, which supplied the Beilungang plant, is now subcontracting for New Sulzer. The big manufacturer of diesel engines for electrical power plants has been highly successful in penetrating the Chinese market over the last 8 years, selling 180 engines. "Our success is mainly due to a team of 20 expatriates based in Hong Kong," says Michel Kohler, assistant general director. His main customers are municipalities. New Sulzer now writes 40 percent of its Fr1.6 billion in annual sales with China.

Generating Work for 600 in France

Meanwhile, Cegelac has subcontracted about 40 percent of the work on its 1,200-megawatt hydraulic plant in Congha, near Canton, to French firms. That is Fr500 million in contracts, including those with subsidiaries of the Alcatel-Alsthom group. The plant was inaugurated in August of last year. "The project provided work for 600 people a year in France, 400 of them outside Cegelac," notes Michel Augonnet, the company's marketing director.

Primary suppliers included Sicli, for fire protection; SDME in Grenoble, for section switches; and Trouvay-Cauvin, for pipe work. The latter also works with GEC-Alsthom and Air liquide.

But Cegelac does not just contract work out. It is also becoming a subcontractor itself, and is supplying the electrical and monitoring/control unit for two roll mills owned by Taiyuan Iron and Steel Company in Shanxi province.

Less well established than their German or Italian competitors, French subcontractors need big contracts to get to know the country, make contacts to develop deals directly, or even set up joint ventures. While they still can, that is. For the share of equipment contracts farmed out to local companies will grow as they progress technologically.

Moreover, the Chinese market is becoming increasingly demanding. The central committee of the Chinese Communist Party confirmed its decision to liberalize the economy and abandoned its economic cooldown plan last November, despite the risk of runaway inflation. As a result, growth should continue at a rate of 9 percent this year, down from 10 percent in 1993.

Prompt Payers

The stock of foreign investments already in place doubled in one year, surpassing Fr100 billion in 1993. A particular incentive for French firms is that the Chinese generally pay every penney without delay. But businesses must be on the lookout for counterfeiting, which partners are quite willing to engage in!

France is only China's 12th-ranking trading partner today, far behind Hong Kong, Japan, or the United States. And the country runs a heavy deficit in its exchanges with Peking: Fr12 billion in 1993! With Edouard Balldur's visit, we can hope for a "great leap forward."

Boxed Material: GEC-Alsthom's Obstacle Course

Writing up an offer, stresses GEC-Alsthom, whose thermal power plant in Beilungang, south of Shanghai, is getting off the ground, "keeps no fewer than 25 people busy full time for four months." The company may sign other contracts this year. After an offer is made, the Chinese customer picks it apart for four months. Then begins a new round of "seminars" with the customer, which last anywhere from 10 days to 2 months. The time lag between submission of an offer and placement of an order is another year. It should be noted in passing that a successful offer in China costs GEC-Alsthom the tidy sum of Fr7 to 8 million! Once the contract is signed, new meetings lasting about three weeks each are held every three months, sometimes in France, sometimes in China. This goes on for another good year or year and a half, until on-site construction begins. The company then sends technical assistance teams (up to 15 Frenchmen) on site for the two years the building job lasts. All told, at least three and a half years elapse between signature of the contract and the plant's start of operation.

France: GEC-Alsthom to Build High Speed Train in South Korea

94WS0320A Paris LE MONDE in French 19 Apr 94 p 19

[Article by Martine Laronche: "Preferred Over Its German Rival, GEC-Alsthom Will Build the South Korean TGV [High-Speed Train]"—first paragraph is LE MONDE introduction]

[Text] On Monday 18 April, GEC-Alsthom announced that the Korean government had signed a letter of intent with the French-British consortium for the construction of a high-speed railroad between Seoul and Pusan (432 km). The contract amounts to $2.1 billion (12 billion francs [Fr]).

GEC-Alsthom will build the South Korean high-speed railroad. According to a communique published by GEC-Alsthom on Monday 18 April, the Korea High Speed Rail Construction Authority (KHRCA), the Korean organization in charge of the project, signed a letter of intent with the French-British consortium, for an amount of about $2.1 billion (Fr12 billion). The German Siemens and its ICE (Inter-City Express) are out.

The contract, which should be signed in May, concludes stormy and difficult negotiations. Between the announcement that the French project was preferred, last August,

and the final selection of GEC-Alsthom, eight months went by, which saw a lot of unexpected developments. The French-German battle caused some heated exchanges that for a time cast a doubt on the issue of the negotiations. Siemens, which has not yet sold its ICE abroad, eagerly took the offensive.

Last November, the German manufacturer reduced its bid by 10 percent, to $2.11 billion, while the French-British proposal amounted to $2.3 billion. The Korean government jumped at the opportunity: on 28 December 1993, it granted extra time to the two remaining competitors' bids. The Korean government thus had an additional argument to renegotiate with its favored candidate. The extended bidding forced GEC-Alsthom to optimize the design of its equipment and to make efforts to increase its productivity. In August 1993, Pierre Bilger, the GEC-Alsthom chief executive officer, said that his group has reached "the extreme limit of financial sacrifices" it could make. The proportion of high-speed trains to be built by Korean manufacturers was increased to 50 percent, instead of 44 percent in the initial bid.

Full Technology Transfer

The French-British consortium also made important concessions with respect to technology transfer. "The Korean partners will get full technology transfer," GEC-Alsthom indicated in its communique. This transfer will involve some 15 South Korean contractors and equipment manufacturers. By the year 2000, the Koreans should be in a position to sell the high-speed train in Asia, but they will need GEC-Alsthom's agreement to bid on European and North American markets. GEC-Alsthom, the TGV Korea Consortium leader, will supply 46 trains, with a capacity of about 1,000 seats each. Thirty-four of these will be made in Korea (with a certain proportion of French components). On location, Hyundai, Daewoo, and Hanjin Industries will manufacture the rolling stock, while Goldstar and Samsung will supply the signalling equipment and traffic-control systems. The high-speed trains will be assembled and tested by Hyundai. The motor units will be manufactured by Hyundai and Daewoo. Hanjin Industries will make the motor coaches.

Twelve trains will be manufactured in France. Cegelec, a subsidiary of Alcatel Alsthom, will provide the catenary equipment, and CSEE-Transport [Electric Signal and Project Company] the speed-control equipment. Sofrerail, the SNCF [French National Railroad Company] engineering subsidiary, will help with training, operation, and maintenance.

The high-speed train should connect Seoul to Taejon (less than 200 km) at 300 km/h by the end of 1999. The entire Seoul-Pusan line (432 km) will be set into service at the end of 2001. "Traffic should amount to more than 80 million passengers per year already during the first years of operation," GEC-Alsthom indicated. This is a fifth success for French technology on export markets, coming after several European high-speed railroads (the Spanish AVE [expansion not given] between Madrid and Seville, the Eurostar trains in the near future, the PBKA [expansion not given] that will connect Paris to London and Paris to Brussels by 1996) and the Texan high-speed railroad between Dallas, Houston, and San Antonio. For the time being, the latter is at a standstill for lack of financing. A total of 571 GEC-Alsthom high-speed trains are in service or on order throughout the world.

France Said to Seek S&T Cooperation in Southeast Asia

94WS0332C Paris AFP SCIENCES in French 28 Apr 94 p 1

[Text] Paris—French minister of higher education and research, Francois Fillon, undertook the first leg of a difficult journey, slated to last until 1 May, on 25 April. The minister will visit Vietnam and Cambodia, two countries of widely different economic and political profiles, but which have been profoundly marked by the history of the last 50 years.

Fillon is the fourth French minister to have traveled to this part of southeast Asia over the last few months. For the last three years—and especially since the French president's trip in February of 1993—France has sought to regain its political and cultural influence and play a role in the region's economic development.

Besides the technical goals of the trip, which aims to shore up scientific and technical collaboration, Fillon's visit is meant to show the great political priority accorded to Vietnam and Cambodia in French strategy.

Vietnam has been a booming potential "small dragon" ever since it opened itself to the "market economy." And France has been helping the country and its 72 million inhabitants, half of whom are under the age of 20, reintegrate the international financial community for a year. In 1994 France will boost its aid to Vietnam to nearly 600 million French francs [Fr]. Beyond that, however, it will work on effectively coordinating and clearly defining the objectives of cultural, scientific, and technical collaboration.

Such collaboration, which has been instigated over the years by research organizations, universities, or Franco-Vietnamese associations, is jumbled and needs refocusing. France will spend Fr75 million on it this year, against Fr45 million in 1992. Assistance will involve education in law—Vietnam wants to become a law-based state to better assimilate into the rest of the world—and the training of professionals in management, banking, aeronautics, oil and mining, earthquake prediction, oceanography, data processing, agronomics, geology, medicine, and biology....

Vietnam boasts 300 research and 108 educational institutes. Its higher education system is in the process of a total renovation that is expected to result in the creation of three "national" universities (Hanoi, Ho Chi Minh-City, and Hue), which will act of centers of excellence in relation to provincial universities.

A French-speaking country in which the influence of English is growing, Vietnam would like French to continue to be taught, and wants to create bilingual high schools to ensure the survival of its 28 existing bilingual classes. Its ultimate goal is to have 105 such classes by 2001.

Mercedes-Benz Plans Diesel Engine, Bus Projects in China

94WS0351B Duesseldorf HANDELSBLATT in German 29/30 Apr 94 p 25

[Article by sz: "Discussions About Large Projects in China"]

[Text] Shanghai—After the projects in India, Mercedes-Benz AG is now planning several major projects in China. Essentially, it involves construction of a diesel engine plant in Changchun in northern China with First Automotive Corp. There are also negotiations about the manufacture of buses. In southern China Mercedes-Benz wants to build a wide-body limousine at two production sites. Here the group is in competition with the U.S. Chrysler Corp.

This is what Eberhard Herzog, ex-member of the executive board and advisor to the board of Mercedes-Benz AG, told the HANDELSBLATT. Herzog took part in the trip through China made by the minister-president of Baden-Wuerttemberg, Erwin Teufel.

The diesel engine factory is to build medium-duty four- and six-cylinder engines. The Japanese competition (Hino) is also bidding for the project. There are plans for construction of at least 100,000 diesel engines for trucks and buses. As for the engine, it is a new development of the most modern design. The engine will then also be installed in Mercedes utility vehicles in Germany and worldwide. The project involves a volume of more than 500 million German marks [DM].

At two production sites in south China's Guangdong province and on the island of Hainan (a special economic province) a wide-body limousine will also be constructed. Here the partner is Nanfang Corp. The Chrysler Corp. is the most promising candidate for this, if President Clinton extends the most-favored-nation status in June by another year. Clinton and Chancellor Kohl have put in a good word to the Chinese government for their countries' enterprises. Due to regional vanities, however, the production is to be divided between two sites, which is not likely to facilitate the production.

Negotiations are also under way with Shanghai Automotive Industrial Corp. about the construction of luxury buses by Mercedes-Benz in modular construction, initially with a minor Chinese share of the manufacturing. Two additional bus manufacturers are negotiating with Mercedes-Benz for a simpler long-distance intercity bus.

Furthermore, numerous state-owned conglomerates in other cities and provinces which are involved in the construction of utility vehicles and cars are wooing the Stuttgart group with offers of cooperation. Among them is also a delivery vehicle plant in Shenyang in northern China, where the manufacture is taking place in old Toyota production facilities. Here the governor of the province has submitted the offers of cooperation to Mercedes-Benz. Japanese auto manufacturers have more or less circumvented the state council through cooperations with the provinces and in this way are trying to grab production sites in China. In northern China Mercedes-Benz also has a utility vehicle project with an enterprise that belongs to the Ministry of Defense.

According to Herzog, Mercedes-Benz AG will be forced to concentrate on a few core projects in China. There are no thoughts of any passenger car production. At present the Ministry of Machine-Building is not issuing any more permits for passenger car projects with the exception of the Nanfang venture.

Foreign Broadcast Information Service (FBIS) and Joint Publications Research Service (JPRS) publications contain political, military, economic, environmental, and sociological news, commentary, and other information, as well as scientific and technical data and reports. All information has been obtained from foreign radio and television broadcasts, news agency transmissions, newspapers, books, and periodicals. Items generally are processed from the first or best available sources. It should not be inferred that they have been disseminated only in the medium, in the language, or to the area indicated. Items from foreign language sources are translated; those from English-language sources are transcribed. Except for excluding certain diacritics, FBIS renders personal names and place-names in accordance with the romanization systems approved for U.S. Government publications by the U.S. Board of Geographic Names.

Headlines, editorial reports, and material enclosed in brackets [ ] are supplied by FBIS/JPRS. Processing indicators such as [Text] or [Excerpts] in the first line of each item indicate how the information was processed from the original. Unfamiliar names rendered phonetically are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear from the original source but have been supplied as appropriate to the context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by the source. Passages in boldface or italics are as published.

SUBSCRIPTION/PROCUREMENT INFORMATION

The FBIS DAILY REPORT contains current news and information and is published Monday through Friday in eight volumes: China, East Europe, Central Eurasia, East Asia, Near East & South Asia, Sub-Saharan Africa, Latin America, and West Europe. Supplements to the DAILY REPORTs may also be available periodically and will be distributed to regular DAILY REPORT subscribers. JPRS publications, which include approximately 50 regional, worldwide, and topical reports, generally contain less time-sensitive information and are published periodically.

Current DAILY REPORTs and JPRS publications are listed in *Government Reports Announcements* issued semimonthly by the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161 and the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The public may subscribe to either hardcover or microfiche versions of the DAILY REPORTs and JPRS publications through NTIS at the above address or by calling (703) 487-4630. Subscription rates will be provided by NTIS upon request. Subscriptions are available outside the United States from NTIS or appointed foreign dealers. New subscribers should expect a 30-day delay in receipt of the first issue.

U.S. Government offices may obtain subscriptions to the DAILY REPORTs or JPRS publications (hardcover or microfiche) at no charge through their sponsoring organizations. For additional information or assistance, call FBIS, (202) 338-6735,or write to P.O. Box 2604, Washington, D.C. 20013. Department of Defense consumers are required to submit requests through appropriate command validation channels to DIA, RTS-2C, Washington, D.C. 20301. (Telephone: (202) 373-3771, Autovon: 243-3771.)

Back issues or single copies of the DAILY REPORTs and JPRS publications are not available. Both the DAILY REPORTs and the JPRS publications are on file for public reference at the Library of Congress and at many Federal Depository Libraries. Reference copies may also be seen at many public and university libraries throughout the United States.

END OF FICHE DATE FILMED

22 July 1994